Project Definition and Execution Strategy

Milton Gorden, Siting and Environmental Manager

July 13, 2023

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Agenda

- Safety Moment
- Site Overview
- Purpose and Need
- Alternatives Analysis Approach
- Site Characterization Activities
  - Noninvasive Activities
  - Meteorological Data Sources and Tower
  - Approach to Geotechnical Investigations and Preliminary Safety Analysis Report (PSAR) – related Groundwater Wells
- Environmental Report and PSAR Chapter 2 Submission Schedule
- Department of Energy Office of Clean Energy Demonstrations (DOE OCED) National Environmental Policy Act (NEPA) Actions Associated with the Project

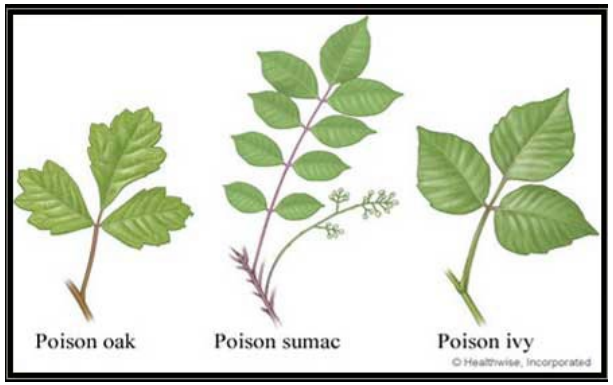
Objectives:

- NRC Staff familiarity with the Proposed Xe-100 Site Location adjacent to Dow Seadrift Operations (SDO)
- NRC feedback on use of nearby sources of data related to the South Texas Project, Victoria County Station, and nearby airports
- NRC Staff familiarity with general site hazards to be assessed
- NRC Staff feedback on Purpose and Need and Alternative Sites
- NRC Staff update on site characterization activities and feedback on meteorological data usage
- NRC Staff feedback on Environmental Report (ER) and PSAR Chapter 2 submission schedule
- NRC Staff update on DOE OCED NEPA activities

Safety Moment - Workplace Hazards Associated with Flora/Fauna

- Wide Variety of Hazards – Site Specific
  - Poison oak/ivy/sumac
  - Poisonous/dangerous animals and insects

- Know your site
- Identify Flora/Fauna that can put workers at risk
- Develop safety measures to minimize chance of contact
- Address in HASP and in daily toolbox meetings



This Is SDO

PEOPLE EMPLOYED

~1,400

FOOTPRINT

4700 acres

MANUFACTURING UNITS

11 Units

+1 iPark (Braskem/WatCo)

ANNUAL PRODUCTION

4B Lbs.

Site History

Approaching 70 years of **community partnership**

- Construction began in 1952 with initial startup in 1954.
- Joined Dow with Union Carbide Corp. Merger in 2001
- Added F-Unit in 2017 (formerly DuPont)

Products

40+

Products Made

Continuous (24 Hour) Operations

Our products are shipped through **rail, barge, and truck**

Employee Resource Group (ERG) Participation

10

Dow ERGs

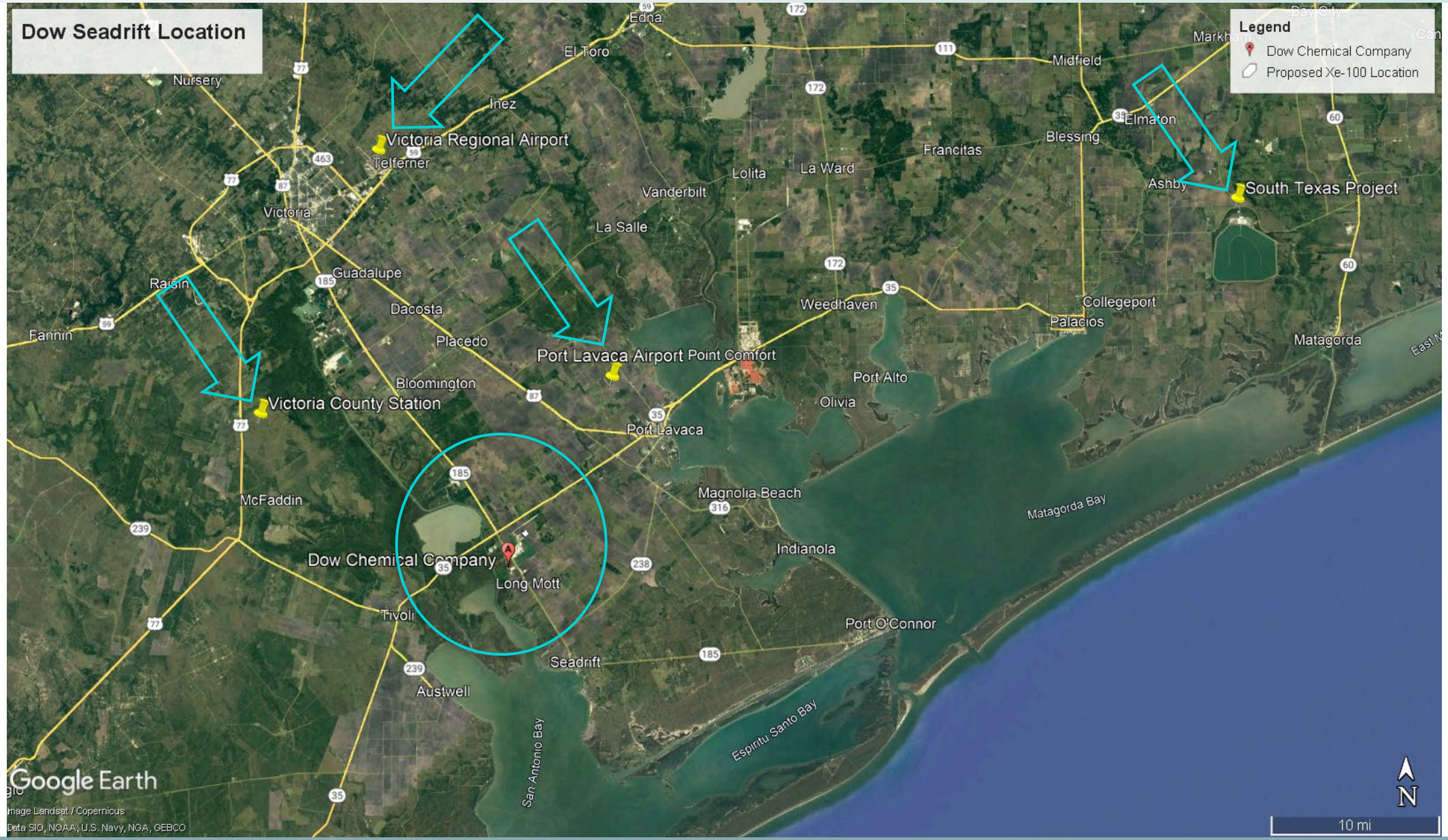
100%

of people leaders participate in Dow ERGs

ADN/MENA
DEN
GAAN
GLAD
HLN
RISE
PR!ME
VetNet
WIN

ADN/MENA – Asian and middle east / north African network
DEN – Disability employee network
GAAN – African American network
GLAD – LBGTQ+ network
HLN – Hispanic Latino Network
RISE – new employees
PR!ME – experienced employees
VetNet – veterans network
WIN – Women's network

Dow Seadrift Location



Proposed Site

Distance and Elevation in Relation to Nearby Facilities

Facility	Approximate Distance from Site A – Miles (kilometers)	General Elevation above Sea Level - Feet (meters)
Xe-100 at Site A	n/a	27 (8)
South Texas Project (STP)	48 (77)	29 (9)
Victoria County Station (VCS)	17 (27)	80 (24)
Victoria Regional Airport	25 (40)	115 (35)
Port Lavaca Airport	10 (16)	30 (9)

STP – Nearest operating Nuclear Power Plant. Two Westinghouse 1280 MWe Pressurized Water Reactors

VCS – Exelon-proposed two 1535 MWe General Electric-Hitachi Simplified Boiling Water Reactors (application accepted by the NRC but withdrawn by Exelon in 2012)

Hazard Analysis Regulatory Basis

- 10 CFR 50.34, Xe-100 Principal Design Criteria (PDC) 2, 10 CFR 100.20(b)(c), 10 CFR 100.21(d)(e), 10 CFR 100.23 – Requires man-made hazards and environmental hazards to be evaluated
- NUREG-0800, Chapter 2
    - Uses a traditional approach
    - Provides guidance on evaluating man-made hazards, meteorological hazards, floods, potential dam failures, surge and seiche flooding, tsunami hazards, ice effects, seismic, etc.
    - Uses deterministic-based evaluations that tend to be conservative
- NEI 18-04
    - Uses a risk-informed performance-based approach (X-energy will be FOAK user)
    - PSAR Chapter 6 identifies the Design Basis Hazard Levels (DBHLs)
    - DBHLs are limits that the Safety-related (SR) SSCs must withstand
    - Hazard screening technical requirements allow hazards to be screened out of the PRA
        - For example, hazards < 10^{-7}/plant-year can be screened out
- Draft Interim Staff Guidance, DANU-ISG-2022-02, Advanced Reactor Content of Application Project, Chapter 2, “Site Information,” May 2023
- License Basis Event (LBE) selection methodology was addressed in the NEI 18-04 Licensing Topical Report (Revision 2 received a Safety Evaluation from the NRC). Pre-submittal meeting for Chapter 3 content planned for summer 2023.
- LBE analysis methodology will be addressed more fully in Licensing Topical Report “Transient and Safety Analysis Methodologies” to be submitted to the NRC in November 2023.
- Hazard assessment approach in PSAR Chapter 2 planned to be presented to the NRC Staff in September 2023

Floods

Probable Maximum Storm Surge (PMSS)

- PMSS event for this site would be a probable maximum hurricane
- Analysis will assume storm surge, high tide, and sea level rise due to climate change in next 60 years consistent with NUREG/CR-7046, “Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the Unites States of America,” Regulatory Guide (RG) 4.7, and latest technical reports from the National Oceanic and Atmospheric Administration and Intergovernmental Panel on Climate Change

Probable Maximum Flood (PMF) in Streams and Rivers

- Will address the Guadalupe River Basin
- Includes wind set-up and wave run-up
- Uses information from Victoria County Station to develop the Design Basis Hazard Level (DBHL)

Dam Failure

- 29 dams on Guadalupe River in Calhoun County, TX
- Assume largest dam failure
- Will use Victoria County Station analysis as a basis to develop the DBHL

Probable Maximum Precipitation (PMP)

- Will assume all storm drains, culverts, and catch basins are clogged
- For a 6 hour, 5.33 in/hr (13.54 cm/hr) rainfall over 10 sq. miles (26 sq. km), the PMP would be 32 inches (81 cm)
- Will use same approach as Victoria County Station analysis to develop the DBHL

Chemical Hazards

Fixed

- Large tanks of ammonia

Pipelines

- Analysis addresses pipelines within 5 miles (8 km)
- Four underground pipelines to the East of the proposed site
    - One 12-inch ethylene liquid pipeline (probabilistic analysis)
    - Two 6-inch propane gas pipelines (probabilistic analysis)
    - One non-operational line (probabilistic analysis)
- Three underground pipelines to the North-East
    - One 30-inch natural gas pipeline (deterministic analysis)
    - One 6-inch propylene pipeline (probabilistic analysis)
    - One 6-inch propane pipeline (probabilistic analysis)

Chemical storage in Railcars

- Primarily ammonia
- Detection and isolation features and procedures can address chemical hazard concerns

Pipelines in Vicinity of Dow Seadrift

Pipeline and Hazardous Materials Safety Administration

NATIONAL PIPELINE MAPPING SYSTEM

Legend

- Gas Transmission Pipelines
- Hazardous Liquid Pipelines

500 m
1000 ft

Pipelines depicted on this map represent gas transmission and hazardous liquid lines only. Gas gathering and gas distribution systems are not represented.

This map should never be used as a substitute for contacting a one-call center prior to excavation activities. Please call 811 before any digging occurs.

Questions regarding this map or its contents can be directed to npms@dot.gov.

Projection: Geographic

Datum: NAD83

Map produced by the Public Viewer application at www.npms.phmsa.dot.gov

Date Printed: May 26, 2023

811 Know what's below. Call before you dig.

Explosive Overpressure

RG 1.91 states that an explosive overpressure of 1 psid is appropriate for a damage criterion. X-energy may be able to demonstrate some structures can withstand up to 3 psid without loss of function

Stationary Blasts

- Per 49 CFR 179.13, chemical max. mass in a railcar would lead to 1 psid overpressure at 0.6 miles and 3 psid overpressure at 0.3 miles (0.5 km)
- Dow plant information for postulated overpressures will be incorporated into Xe-100 facility analyses

Flammable Vapor Clouds

- 49 CFR 179.13 max. railcar release has a standoff distance of 0.5 miles (0.8 km) to the lower explosive limit
- Ethane from a pressurized pipe has a standoff distance of 0.22 miles (0.35 km) to the lower explosive limit
- Ethylene from a pressurized pipe has a standoff distance of 0.67 miles (1.1 km) to the lower explosive limit
- For the 30-in (0.76 cm) natural gas pipeline, a probabilistic analysis is needed, but is expected to show a 0.5-mile distance is acceptable

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Purpose and Need and Site Alternatives Analysis Approach

Purpose and Need

The purpose of the Xe-100 is to replace three aging natural gas cogeneration units at the Dow Seadrift Plant: (1) provide high-quality steam, (2) provide electricity, and (3) assist Dow in meeting their corporate decarbonization goal of being carbon neutral by 2050.

Basis of Consideration for Alternative Sites

- Delivery of Steam Limits Distance of Candidate Sites from Receiving Plant
- Limiting distance to about 1.5 miles (2.5 km) from interconnection point into processes at receiving plant
- Would keep site on current Dow-owned property
- Eliminates many right-of-way impediments associated with being further away

Alternative Sites

Alternative Site Comparisons

Site A:

Largest site (344 acres [139 hectares]). Buffered on all sides by Dow property. Current use is agricultural. No historic sites within Site A. Not significantly impacted by existing Dow pipelines. Good proximity to roads. Further from railyard than Site C.

Site B:

Site is split by Dow pipelines. Further from roads than Site A.

Site C:

Adjacent to Dow southwest railyard. Smallest acreage (166 acres [67 hectares]). Potential historic resource on Site C that would need to be investigated.

Site D:

Several underground pipelines, including non-Dow-owned pipelines, would need to be relocated. Possibility of other underground obstructions. Electrical substation proposed.

Site A is the Proposed Site

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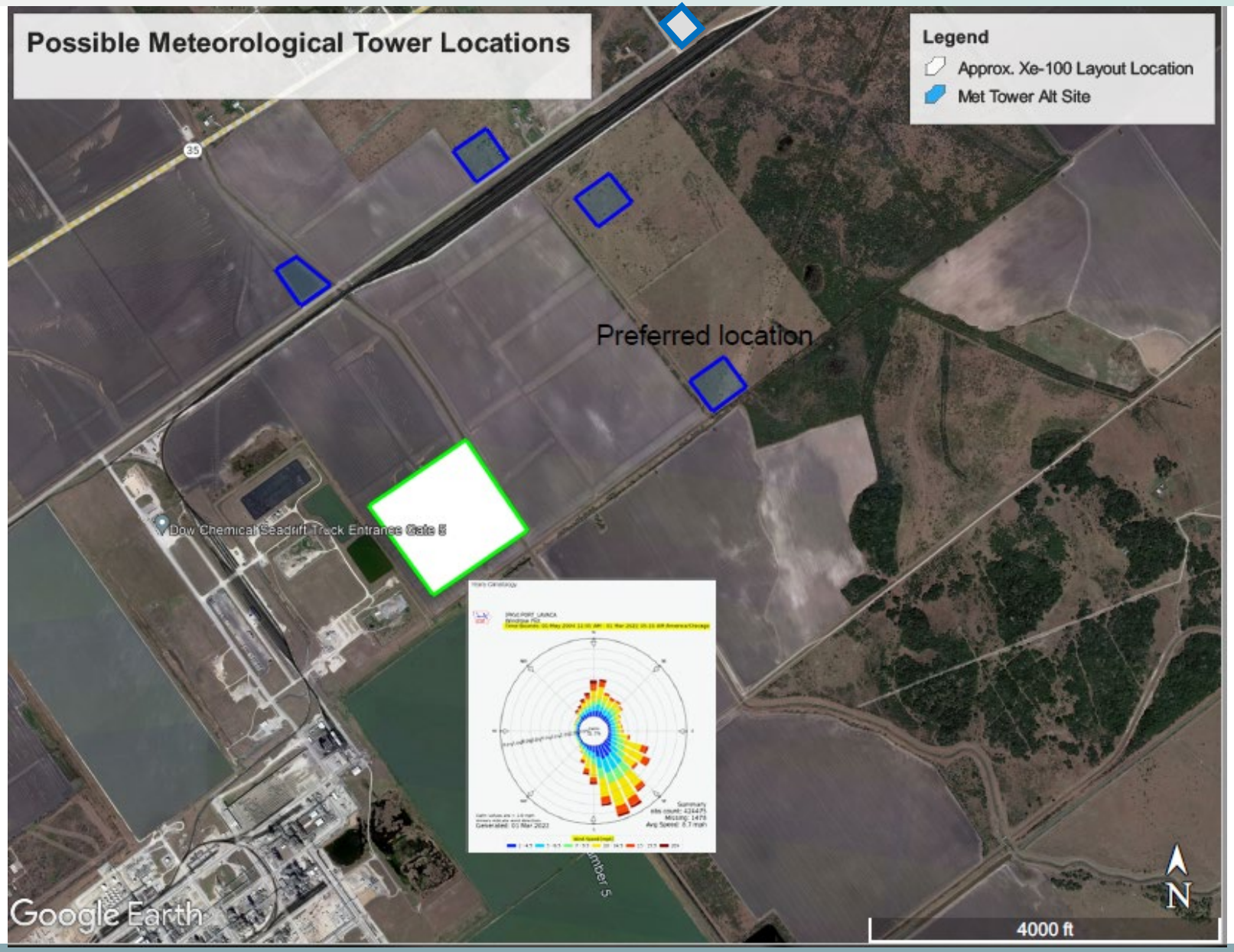
Site A Characterization Activities

- Ecological Surveys – Winter and Spring completed. No significant observations regarding Endangered or Threatened Species
- Noise Survey – To be completed by end of July 2023
- Historic/Cultural Survey – Plan accepted by Texas State Historic Preservation Office. Survey to be performed by end of July 2023
- Surface Water Quality Sampling – Spring completed. Assuming current Dow Seadrift permitted withdrawal and discharge locations pending further analysis
- Meteorological Data
    - For Construction Permit Application, intent is to rely on existing data from South Texas Project
        - Same elevation and relative proximity to the Gulf
    - Meteorological tower to be erected using Regulatory Guide 1.23, “Meteorological Monitoring Programs for Nuclear Power Plants.” Data to be used for Final SAR in Operating License Application (confirmatory)
- Environmental Report-related Groundwater Wells – Installation planned to begin in August with monitoring activities beginning in September
- Geotechnical Investigations and Preliminary SAR-related Groundwater Wells – Boring and groundwater well installation plan drafted. Requesting feedback from the NRC week of July 10, 2023

Meteorological Tower Location



Proposed Environmental Report-related Groundwater Well Locations

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Environmental Report and PSAR Chapter 2 Submission Schedule

Environmental Report (ER)

- The ER would be submitted within 6 months of the CPA initial submittal. The current schedule shows submittal by June 2024
- The ER will contain all content except 6 months of groundwater data and Spring aquatic data, which will be submitted as a supplement by the end of 2024

PSAR Chapter 2

- This chapter would be submitted in unison with the ER in whole, with exception of a complete dataset of groundwater data
- Initial groundwater modeling will rely on enough data to provide a defensible analysis
- Groundwater data and updated modeling (if necessary) would be submitted once all data is obtained as a supplement (or can recommend quarterly submittals of data)

Note: The supplemental groundwater data for the ER and PSAR Chapter 2 would be submitted outside the 6-month window from initial submittal (target: first quarter 2024) of the PSAR as required by 10 CFR 2.101. X-energy would submit an Exemption Request under 10 CFR 50.12.

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DOE-OCED NEPA Actions Associated with the Project

- OCED is addressing site characterization.
  - Completed Categorical Exclusion for Noninvasive activities (OCED-09040-002-CX)
  - NEPA evaluation of subsurface characterization activities is ongoing (to include installation of groundwater wells and performing geotechnical and seismic-related investigations and meteorological tower installation)

- OCED will perform a NEPA review of preconstruction activities (those activities not defined as construction, as described in 10 CFR 50.10(a)(2) and RG 1.206)

- OCED is performing a “streamlined” Environmental Assessment to address proposed construction and operational activities associated with the Helium Test Facility, to be located at the Horizon Center in Oak Ridge, Tennessee. The HTF will be a non-nuclear facility. Performance of this NEPA review is not expected to impact the schedule for the construction and operation of the HTF.

X Energy, LLC

Phone: 301.358.5600
801 Thompson Avenue • Rockville, MD 20852

x-energy.com @xenergynuclear