Weston Solutions, Inc.
5301 Southwest Parkway, Suite 450
Austin, Texas 78735
512-651-7100 • Fax 512-651-7101

ORIGINAL

25 November 2019

Texas Commission on Environmental Quality
Water Quality Section
Waste Permits Division
P.O. Box 13087
12100 Park 35 Circle, Building F
Austin, TX 78711-3087

RE: Transmittal of TPDES Renewal Application WQ0004158-000
RN 100224302 Corpus Christi Cogeneration
CN 600131726 Corpus Christi Cogeneration, L.L.C.
CN 602680076 Calpine Operating Services Company, Inc.

Dear Sir or Madam:

Weston Solutions, Inc. (WESTON®) is pleased to submit this Texas Pollutant Discharge Eliminations System (TPDES) permit renewal application for the above-referenced facility on behalf of the Corpus Christi Cogeneration. One original and three copies are being transmitted.

Payment for the permit application fee has been made via check; a copy of the receipt is included with this submittal in Attachment A.

Should you have any questions regarding this submittal, please call me at (512) 651-7104.

Very truly yours,
WESTON SOLUTIONS, INC.

N. L. Koch

Nancy L. Koch, P.E.
Project Manager

cc: Jan Stavinoha, Calpine

RECEIVED
NOV 25 2019
Water Quality Division
Application Team

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TCEQ INDUSTRIAL WASTEWATER PERMIT APPLICATION

INDUSTRIAL ADMINISTRATIVE REPORT

Complete and submit this checklist with the application.

APPLICANT NAME: Corpus Christi Cogeneration, L.L.C. and Calpine Operating Services Company, Inc.

PERMIT NUMBER: WQ0004158-000

Check Y for each of the following items included in this application. If an item was not included, check N.

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☒
Administrative Report 1.1	☐	☒	Worksheet 9.0	☐	☒
SPIF	☒	☐	Worksheet 10.0	☐	☒
Core Data Form	☒	☐	Worksheet 11.0	☒	☐
Technical Report 1.0	☒	☐	Worksheet 11.1	☒	☐
Worksheet 1.0	☒	☐	Worksheet 11.2	☒	☐
Worksheet 2.0	☐	☒	Worksheet 11.3	☒	☐
Worksheet 3.0	☐	☒	Original USGS Map	☒	☐
Worksheet 3.1	☐	☒	Affected Landowners Map	☐	☒
Worksheet 3.2	☐	☒	Landowner Disk or Labels	☐	☒
Worksheet 3.3	☐	☒	Flow Diagram	☒	☐
Worksheet 4.0	☒	☐	Site Drawing	☒	☐
Worksheet 4.1	☐	☒	Original Photographs	☒	☐
Worksheet 5.0	☐	☒	Solids Management Program	☐	☒
Worksheet 6.0	☐	☒	Water Balance	☐	☒
Worksheet 7.0	☐	☒			

For Commission Use Only:
Segment Number: _____ County: _____ Expiration Date: _____
Proposed/Current Permit Number: _____ Region: _____

INDUSTRIAL ADMINISTRATIVE REPORT 1.0

The following information **is required** for **all** applications for TPDES permits and TLAPs.

1. TYPE OF APPLICATION AND FEES (Instructions, Page 21)

a. Permit No.: WQ0004158000 Expiration Date: June 1, 2020

EPA ID No.: TX0119725

b. Check the box next to the appropriate application type.

☐ New TPDES permit
☐ Major amendment with renewal
☐ Renewal with changes
☐ Minor amendment without renewal
☐ Stormwater only discharge
☐ New TLAP permit
☐ Major amendment without renewal
☒ Renewal without changes
☐ Minor modification without renewal

c. If applying for an **amendment** or **modification** of a permit, describe the request in detail: Click to enter text.

d. Application Fee

Check the box next to the amount submitted for the application fee:

EPA Classification	New	Major Amendment (With or Without Renewal)	Renewal (With or Without Changes)	Minor Amendment/ Minor Modification (Without Renewal)
Minor facility not subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☐ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A *	☐ $2,050	☒ $2,015	☐ $450

* All facilities are designated as minors until formally classified as a major by EPA.

e. Payment Information:

Mailed Check or money order number: Click to enter text.

Check or money order amount: Click to enter text.

Named printed on check or money order: _____ Copy included in Attachment A.

ePAY Voucher number: Click to enter text.

Copy of voucher attached? ☐ Yes **Attachment**: Click to enter text.

2. APPLICANT INFORMATION (Instructions, Pages 21-22)

a. Facility Owner (Owner of the facility must apply for the permit.)

- Provide the legal name of the entity (applicant) applying for this permit: Corpus Christi Cogeneration, L.L.C.

  (The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.)

- If the applicant is currently a customer with the TCEQ, provide the Customer Number, which can be located using the TCEQ's Central Registry Customer Search[1]: **CN**600131726

- Provide the name and title of the person signing the application. The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

  Mr. ☒ Ms. ☐ First/Last Name: Patrick Blanchard

  Title: Director Environmental Health and Safety Credential: Click to enter text.

b. Co-applicant Information

- Provide the legal name of the co-applicant applying for this permit, if applicable: Calpine Operating Services Company, Inc. (COSCI)

  (The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.)

- If the co-applicant is currently a customer with the TCEQ, provide the Customer Number, which can be located using the TCEQ's Central Registry Customer Search: **CN**602680076

- Provide the name and title of the person signing the application. The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

  Mr. ☒ Ms. ☐ First/Last Name: Patrick Blanchard

  Title: Director Environmental Health and Safety Credential: Click to enter text.

- Provide a brief description of the need for a co-permittee: COSCI operates the Corpus Christi Energy Center

c. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of the Administrative Report.

Attachment: B

3. APPLICATION CONTACT INFORMATION (Instructions, Page 22)

If the TCEQ needs additional information regarding this application, who should be contacted?

a. Mr. ☐ Ms. ☒ First/Last Name: Nancy L. Koch Credential: P.E.

Organization Name: Weston Solutions, Inc. Title: Project Manager

Mailing Address: 5301 Southwest Parkway, Suite 450 City/State/ZIP Code: Austin, TX 78735

Phone No.: (512) 651 - 7104 Fax No.: Click to enter text. E-mail: nancy.koch@westonsolutions.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

[1] http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

b. Mr. ☐ Ms. ☒ First/Last Name: Jan Stavinoha Credential: Click to enter text.

Organization Name: Calpine Operating Services Company, Inc. Title: EHS Manager

Mailing Address: 717 Texas Avenue, Suite 1000 City/State/ZIP Code: Houston, TX 77002

Phone No.: 713-570-4814 Fax No.: Click to enter text. E-mail: Jan.Stavinoha@Calpine.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

Attachment: Click to enter text.

4. PERMIT CONTACT INFORMATION (Instructions, Page 22)

Provide two names of individuals that can be contacted throughout the permit term.

a. Mr. ☒ Ms. ☐ First/Last Name: Ronald C. Hall Credential: Click to enter text.

Organization Name: Calpine Operating Services Company, Inc. Title: Vice President, Regional Operations

Mailing Address: 717 Texas Ave. Suite 1000 City/State/ZIP Code: Houston, TX 77002

Phone No.: (713) 830 - 2000 Fax No.: Click to enter text. E-mail: ronald.hall@calpine.com

b. Mr. ☐ Ms. ☐ First/Last Name: Click to enter text. Credential: Click to enter text.

Organization Name: Click to enter text. Title: Click to enter text.

Mailing Address: Click to enter text. City/State/ZIP Code: Click to enter text.

Phone No.: Click to enter text. Fax No.: Click to enter text. E-mail: Click to enter text.

Attachment: Click to enter text.

5. BILLING CONTACT INFORMATION (Instructions, Page 22)

The permittee is responsible for paying the annual fee. The annual fee will be assessed to permits **in effect on September 1 of each year**. *The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).*

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Mr. ☒ Ms. ☐ First/Last Name: Andy McDonald Credential: Click to enter text.

Organization Name: Calpine Operating Services Company Title: Plant Manager

Mailing Address: 3952 Buddy Lawrence Drive. City/State/ZIP Code: Corpus Christi, TX 78407

Phone No.: (830) 608 - 3011 Fax No.: Click to enter text. E-mail: andrew.mcdonald@calpine.com

6. DMR/MER CONTACT INFORMATION (Instructions, Page 22)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs.

Mr. ☒ Ms. ☐ First/Last Name: Charles Randall Credential: Click to enter text.

Organization Name: Calpine Operating Services Company, Inc. Title: EH&S Specialist III

Mailing Address: 3952 Buddy Lawrence Drive City/State/ZIP Code: Corpus Christi, TX 78407

Phone No.: (956) 587 - 3262 Fax No.: Click to enter text. E-mail: charles.randall@calpine.com

DMR data must be submitted through the NetDMR[2] system. An electronic reporting account can be established once the facility has obtained the permit number.

7. NOTICE INFORMATION (Instructions, Pages 23-24)

a. Individual Publishing the Notices

Mr. ☐ Ms. ☒ First/Last Name: Nancy L. Koch Credential: P.E.

Organization Name: Weston Solutions, Inc. Title: Project Manager

Mailing Address: 5301 Southwest Parkway, Suite 450 City/State/ZIP Code: Austin, TX 78735

Phone No.: 512-651-7104 Fax No.: Click to enter text E-mail: nancy.koch@westonsolutions.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☐ E-mail: nancy.koch@westonsolutions.com

☐ Fax: Click to enter text

☐ Regular Mail (USPS)

Mailing Address: Click to enter text City/State/ZIP Code: Click to enter text

c. Contact in the Notice

Mr. ☐ Ms. ☒ First/Last Name: Jan Stavinoha Credential: Click to enter text

Organization Name: Calpine Operating Services Company, Inc. Title: EHS Manager

Phone No.: (713) 570 - 4814 Fax No.: Click to enter text E-mail: jan.stavinoha@calpine.com

d. Public Place Information

If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: La Retama Central Library Location within the building: Front Desk

Physical Address of Building: 805 Comanche Street

City: Corpus Christi County: Nueces

e. Bilingual Notice Requirements:

This information **is required** for **new, major amendment, and renewal applications**. It is not required for minor amendment or minor modification applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Please call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine whether an alternative language notices are required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

[2] https://www.tceq.texas.gov/permitting/netdmr

☒ Yes ☐ No

If **no**, publication of an alternative language notice is not required; **skip to** Item 8 (REGULATED ENTITY AND PERMITTED SITE INFORMATION.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

☒ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

☐ Yes ☒ No

4. Would the school be required to provide a bilingual education program but the school has waived out of this requirement under 19 TAC §89.1205(g)?

☐ Yes ☒ No

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Spanish

8. REGULATED ENTITY AND PERMITTED SITE INFORMATION (Instructions Pages 24-25)

If the site of your business is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry[3] to determine the RN or to see if the larger site may already be registered as a regulated site:

If the site is found, provide the assigned RN and the information for the site to be authorized through this application below. The site information for this authorization may vary from the larger site information.

a. TCEQ issued Regulated Entity Number (RN): **RN**100224302

b. Name of project or site (the name known by the community where located): Corpus Christi Energy Center (RN Corpus Christi Cogeneration)

c. Is the location address of the facility in the existing permit the same?

☒ Yes ☐ No

d. If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

e. Owner of treatment facility: Corpus Christi Cogeneration, L.L.C.

Ownership of Facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be:

Mr. ☐ Ms. ☐ First/Last or Organization Name: CITGO Refining and Chemicals, L.P.

Mailing Address: P.O. Box 9176 City/State/ZIP Code: Corpus Christi/TX/78467-9176

Phone No.: 918-495-4000 Fax No.: 918-495-4511 E-mail: Click to enter text

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. In some cases, a lease may not suffice - see instructions. **Attachment:** C

[3] http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=regent.RNSearch

g. Owner of effluent TLAP disposal site (if applicable):

Mr. ☐ Ms. ☐ First/Last or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/ZIP Code: Click to enter text.

Phone No.: Click to enter text. Fax No.: Click to enter text. E-mail: Click to enter text.

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. **Attachment**: Click to enter text.

h. Owner of sewage sludge disposal site (if applicable):

Mr. ☐ Ms. ☐ First/Last or Organization Name: Click to enter text.

Mailing Address: Click to enter text. City/State/ZIP Code: Click to enter text.

Phone No.: Click to enter text. Fax No.: Click to enter text. E-mail: Click to enter text.

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. **Attachment**: Click to enter text.

(This information is required only if authorization is sought in the permit for sludge disposal on property owned or controlled by the applicant.)

9. TDPES DISCHARGE/TLAP DISPOSAL INFORMATION (Instructions, Pages 25-28)

a. Is the facility located on or does the treated effluent cross American Indian Land?

☐ Yes ☒ No

b. Attach an **original** full size USGS Topographic Map (or an 8.5"×11" **reproduced** portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

☒ One-mile radius and three-miles downstream information
☒ Applicant's property boundaries
☐ Treatment facility boundaries
☒ Labeled point(s) of discharge and highlighted discharge route(s)
☐ Effluent disposal site boundaries
☐ All wastewater ponds
☐ Sewage sludge disposal site
☐ New and future construction
☒ Attachment: D

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ N/A

If **no**, or a **new** application, please give an accurate description: Not applicable – no sewage sludge disposal.

d. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☒ Yes ☐ No ☐ N/A

If **no**, or a **new or amendment** applications, provide an accurate description: Click to enter text.

e. City nearest the outfall(s): Corpus Christi

f. County in which the outfalls(s) is/are located: Nueces

g. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If **yes**, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For **new and amendment** applications, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: Click to enter text.

h. For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge. NA, permitted flow is less than 5 MGD.

i. For **TLAPs**, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ N/A

If **no**, or if this a **new or amendment** application, provide an accurate description: Click to enter text.

j. City nearest the disposal site: NA

k. County in which the disposal site is located: NA

l. Disposal Site Latitude: NA Longitude: NA

m. For **TLAPs**, describe how effluent is/will be routed from the treatment facility to the disposal site: NA

n. For **TLAPs**, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: NA

10. MISCELLANEOUS INFORMATION (Instructions, Page 28)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If **yes**, list each person: Click to enter text.

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following:

- Acct. No.: Click to enter text.
- Amt. due: Click to enter text.

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following:

- Enforcement Order No.: Click to enter text.
- Amt. due: Click to enter text.

11. SIGNATURE PAGE (Instructions, Page 29)

Permit No: WQ0004158000

Applicant Name: Calpine Operating Services Company, Inc.

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 there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory name (typed or printed): Patrick Blanchard

Signatory title: Director Environmental Health and Safety

Signature: _____ Date: 11-20-19

(Use blue ink)

Subscribed and Sworn to before me by the said Patrick Blanchard

on this 20th day of November, 20 19.

My commission expires on the 11 day of June, 20 19.

Shannon Hutchinson

Notary Public

Shannon Hutchinson
My Commission Expires
06/11/2021
ID No. 125171357

[SEAL]

Harris

County, Texas

If co-applicants are necessary, each entity must submit an original, separate signature page.

11. SIGNATURE PAGE (Instructions, Page 29)

Permit No: WQ0004158000

Applicant Name: Corpus Christi Cogeneration, L.L.C.

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 there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory name (typed or printed): Patrick Blanchard

Signatory title: Director Environmental Health and Safety

Signature: _____ Date: 11-20-19

(Use blue ink)

Subscribed and Sworn to before me by the said Patrick Blanchard

on this 20th day of November, 20 19.

My commission expires on the 11 day of June, 20 19.

Shannon Hutchinson

Notary Public

Shannon Hutchinson
My Commission Expires
06/11/2021
ID No. 125171357

[SEAL]

Harris

County, Texas

If co-applicants are necessary, each entity must submit an original, separate signature page.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING INDUSTRIAL TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: ____Renewal _____Major Amendment ____Minor Amendment _____New

County: _____ Segment Number: _____

Admin Complete Date: _____

Agency Receiving SPIF:

_____ Texas Historical Commission _____ U.S. Fish and Wildlife

_____ Texas Parks and Wildlife Department _____ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 33)

The SPIF must be completed as a separate document. The TCEQ will mail a copy of the SPIF to each agency as required by the TCEQ agreement with EPA. If any of the items are not completely addressed or further information is needed, you will be contacted to provide the information before the permit is issued. Each item must be completely addressed.

Do not refer to a response of any item in the permit application form. Each attachment must be provided with this form separately from the administrative report of the application. The application will not be declared administratively complete without this form being completed in its entirety including all attachments.

The following applies to all applications:

1. Permittee Name: Corpus Christi Cogeneration, L.L.C. and Calpine Operating Services Company, Inc.

2. Permit No.: WQ0004158000 EPA ID No.: TX0 0119725

3. Address of the project (location description that includes street/highway, city/vicinity, and county): 3952 Buddy Lawrence Drive, Corpus Christi, Nueces County, TX 78407

4. Provide the name, address, phone and fax number, and email address of an individual that can be contacted to answer specific questions about the property.

   First/Last Name: Jan Stavinoha Title: EHS Manager Credential: Click to enter text

   Organization Name: Calpine Operating Services Company, Inc.

   Mailing Address: 717 Texas Avenue, Suite 100 City/State/ZIP Code: Houston, TX 77002

   Phone No.: (713) 570 - 4814 Fax No.: Click to enter text E-mail: jan.stavinoha@calpine.com

5. List the county in which the facility is located: Nueces

6. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property: NA

7. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in *30 TAC Chapter 307*). If known, please identify the classified segment number: Corpus Christi Inner Harbor, Segment No. 2484 of Bays and Estuaries.

8. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report.)

   Attachment: Follows this page

9. Provide original photographs of any structures 50 years or older on the property.

   Attachment: None.

10. Does your project involve any of the following? Check all that apply.

    ☐ Proposed access roads, utility lines, construction easements

    ☐ Visual effects that could damage or detract from a historic property's integrity

    ☐ Vibration effects during construction or as a result of project design

    ☐ Additional phases of development that are planned for the future

    ☐ Sealing caves, fractures, sinkholes, other karst features

    ☐ Disturbance of vegetation or wetlands

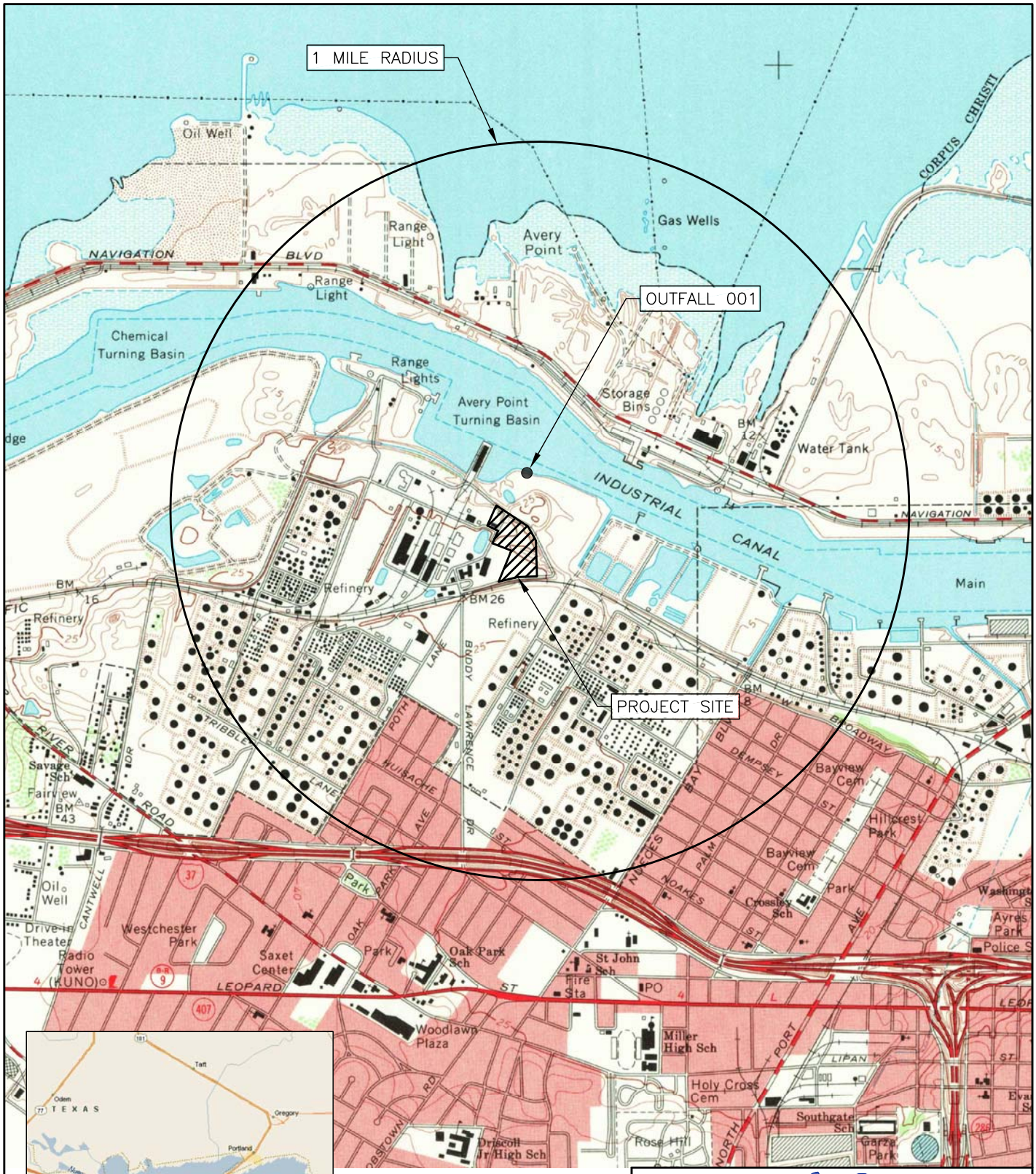
11. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features): None.

12. Describe existing disturbances, vegetation, and land use: The site is an existing gas-fired power plant.

THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

13. List construction dates of all buildings and structures on the property: Click to enter text.

14. Provide a brief history of the property, and name of the architect/builder, if known: Click to enter text.



SOURCE: USGS 7.5 MINUTE SERIES TOPOGRAPHIC, CORPUS CHRISTI, TEXAS (1971).

WESTON SOLUTIONS

FIGURE 1

SITE LOCATION MAP

CORPUS CHRISTI COGENERATION
CORPUS CHRISTI, TEXAS

DATE	PROJECT NO.	SCALE
SEP 2019	14847.010.004.0002	AS SHOWN

X:\Calpine (14847)\14847.010 Corpus Christi\010.004 TPDES Renew\06.0 Data Library\Figures (dwg)\0917191456.dwg Sep 30, 2019 – 10:00am

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment.

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No: WQ000**4158000

1. Check or Money Order Number: Click to enter text.
2. Check or Money Order Amount: 2,015.00
3. Date of Check or Money Order: Click to enter text.
4. Name on Check or Money Order: Click to enter text.
5. APPLICATION INFORMATION

   Name of Project or Site: Corpus Christi Cogeneration

   Physical Address of Project or Site: 3952 Buddy Lawrence Drive, Corpus Christi, Texas, 78407

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.

Staple Check or Money Order in This Space

TECHNICAL REPORT 1.0
INDUSTRIAL

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For additional information or clarification on the requested information, refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter N/A** to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross-referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

1. FACILITY/SITE INFORMATION (Instructions, Pages 34-35)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

The facility is a cogeneration plant consisting of two combined cycle turbines with heat recovery steam generators, one steam turbine equipped with supplemental duct burner firing, and two auxiliary boilers. SIC Code: 4911 NAICS Code: 221112

b. Describe all wastewater-generating processes at the facility.

Raw seawater for make-up in the closed loop recirculating cooling tower is obtained from a water intake structure owned by CITGO Refining and controlled under lease by Elementis Chromium. Both are adjacent facilities and steam hosts to Corpus Christi Cogeneration. Raw water for boiler make-up is obtained from the City of Corpus Christi's potable system. Cooling water that is not lost to evaporation is eventually blown down for discharge. Raw water for boiler make-up is filtered and treated in a demineralization system before it is used for steam generation in the boilers and/or heat-recovery steam generators. The demineralizer produces wastewater from resin regeneration. Boiler blowdown is also produced as needed. Additional wastewater streams include washdown water and indoor drain water that are collected from areas where lubricating oils are present. This stream is routed through an oil/water separator prior to commingling with the other wastewater streams. Wastewater from indoor drains containing chemicals used in laboratory analysis of water samples is also generated, although the volume is small and generation is infrequent. All wastewater streams would be discharged through external Outfall 001, which has not been constructed. Currently, all wastewater is sent to Elementis for reuse or discharge as authorized in the Elementis TPDES permit #WQ0000349000.

[1] https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Refinery Off-Gas from CITGO	Steam	Electricity
Natural Gas		Steam
Water		
Water Treatment Chemicals		
Lube Oils		

Attachment: None

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: E

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: Click to enter text.

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☒ Yes ☐ No

List source(s) used to determine 100-year frequency flood plain: **FEMA FIRM Map 4854940308C**

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: Click to enter text.

Attachment: Click to enter text.

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☐ Yes ☒ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☐ No

If **yes**, provide the permit number: Click to enter text.

If **no**, provide an approximate date of application submittal to the USACE: Click to enter text.

2. TREATMENT SYSTEM (Instructions, Page 35)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

Neutralization of the ion exchange regeneration wastewater is conducted. An oil/water separator is used for interior floor drains. No other treatment of wastewater is used. All wastewater would be discharged via Outfall 001.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: F

3. IMPOUNDMENTS (Instructions, Pages 35-37)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☐ Yes ☒ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a - 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 35-37, for additional information on the attachments required by Items 3.a – 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment:

Use Designation: Indicate the use designation for each impoundment as Treatment (**T**), Disposal (**D**), Containment (**C**), or Evaporation (**E**).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (**C**), In-situ clay liner (**I**), Synthetic/plastic/rubber liner (**S**), or Alternate liner (**A**). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter **Y** for yes. Otherwise, enter **N** for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)				
Associated Outfall Number				
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction				

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)				
Associated Outfall Number				
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), not including freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction				

Attachment: Click to enter text

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed**.

i. Liner data

☐ Yes ☐ No ☐ Not yet designed

ii. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

iii. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.iii is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: Click to enter text

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: Click to enter text

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: Click to enter text

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click to enter text

4. OUTFALL/DISPOSAL METHOD INFORMATION (Instructions, Pages 38-39)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge operations and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/0r numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Latitude and Longitude

Outfall Number	Latitude-decimal degrees	Longitude-decimal degrees
001	27.817603°	-97.428208°

Outfall Location Description

Outfall Number	Location Description
001	Outfall will be located at the Turning Basin, 0.2 km east of a barge terminal

Description of Sampling Points (if different from Outfall location)

Outfall Number	Description of Sampling Point
001	At the sump, prior to pumping into the pipe conveying the wastewater to the outfall

Outfall Flow Information – Permitted and Proposed

Outfall Number	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)
001	7	10	7	10	NA

Outfall Discharge – Method and Measurement

Outfall Number	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used
001	N	Y	Not yet selected

Outfall Discharge – Flow Characteristics

Outfall Number	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)
001	N	Y	N	24	31	12

Wastestream Contributions

Outfall No.: 001

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Cooling Tower Blowdown	6.30	90.1
Demineralizer regen and RO reject	0.514	7.3
Heat Recovery Steam Generator blowdown (within cooling tower blowdown)	0.144	(Included above)
Interior drains, Secondary Containment Areas	0.176	2.5
Lab Drains (de minimis)	-	-
Flow does not add to 100% due to rounding		

Outfall No.: Click to enter text.

Contributing Wastestreams	Volume (MGD)	% of Total Flow

Outfall No.: Click to enter text.

Contributing Wastestreams	Volume (MGD)	% of Total Flow

Attachment: Click to enter text.

5. BLOWDOWN AND ONCE-THROUGH COOLING WATER DISCHARGES (Instructions, Page 39)

a. Does the facility use/propose to use any cooling towers which discharge blowdown or other wastestreams to the outfall(s)?

☒ Yes ☐ No

NOTE: If the facility uses or plans to use cooling towers, Item 12 **is required**.

b. Does the facility use or plan to use any boilers that discharge blowdown or other wastestreams to the outfall(s)?

☒ Yes ☐ No

c. Does or will the facility discharge once-through cooling water to the outfall(s)?

☐ Yes ☒ No

NOTE: If the facility uses or plans to use once-through cooling water, Item 12 **is required**.

d. If **yes** to Items 5.a, 5.b, **or** 5.c, attach the SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

Attach a summary of this information in addition to the submittal of the SDS for each specific wastestream and the associated chemical additives and specify which outfalls are affected.

Attachment: G

e. Cooling Towers and Boilers

If **yes** to either Item 5.a **or** 5.b, complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Dly Avg Blowdown (gallons/day)	Dly Max Blowdown (gallons/day)
Cooling Towers	1	6.3 M	9.0 M
Boilers	2	0.144 M	0.201 M

6. STORMWATER MANAGEMENT (Instructions, Pages 39-40)

Are there any existing/proposed outfalls which discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☒ Yes ☐ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in some manner which may result in exposure of the activities or materials to stormwater: Curbed areas around equipment

(transformers, HSRGs, steam turbine, etc.) stormwater that is routed through an oil/water separator and can be used as cooling tower makeup or discharged. Secondary containment areas for tanks are visually inspected before being drained and discharged.

7. DOMESTIC SEWAGE, SEWAGE SLUDGE, AND SEPTAGE MANAGEMENT AND DISPOSAL (Instructions, Page 40)

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

☐ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. **Complete Item 7.b**.

☐ Domestic sewage is disposed of by an on-site septic tank and drainfield system. **Complete Item 7.b**.

☐ Domestic and industrial treatment sludge **ARE commingled** prior to use or disposal.

☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge **IS NOT commingled** prior to sludge use or disposal. **Complete Worksheet 5.0**.

☐ Facility is a POTW. **Complete Worksheet 5.0**.

☐ Domestic sewage is not generated on-site.

☒ Other (e.g., portable toilets), specify and **Complete Item 7.b**: **Domestic sewage is stored in an on-site holding tank and is removed and disposed of by a hauler/disposal service.**

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.
Texas Throne, LLC	24337
City of Corpus Christi WWTP	WQ0010401005

8. IMPROVEMENTS OR COMPLIANCE/ENFORCEMENT REQUIREMENTS (Instructions, Page 40)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: Click to enter text.

9. TOXICITY TESTING (Instructions, Page 41)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: Click to enter text.

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA.

Attachment: Click to enter text.

10. OFF-SITE/THIRD PARTY WASTES (Instructions, Page 41)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☐ Yes ☒ No

If **no**, proceed to Item 11. If **yes**, provide responses to Items 10.b through 10.d below.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: Click to enter text.

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click to enter text.

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required**.

11. RADIOACTIVE MATERIALS (Instructions, Pages 41-42)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material	Concentration (pCi/L)

Radioactive Material	Concentration (pCi/L)

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material	Concentration (pCi/L)

12. COOLING WATER (Instructions, Pages 42-43)

a. Does the facility use or propose to use water for cooling purposes?

☒ Yes ☐ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☒ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

i. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID	1			
Owner	CITGO			
Operator	Elementis Chromium and Corpus Christi Cogeneration			

ii. Cooling water is/will be obtained from a Public Water Supplier (PWS)

☐ Yes ☒ No

If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: Click to enter text

iii. Cooling water is/will be obtained from an Independent Supplier

☐ Yes ☒ No

If **no**, proceed to Item 12.d. If **yes,** contact the Industrial Permits Team to determine what application materials are required. Attach copies of the correspondence with the TCEQ and any required application materials, as stipulated in the correspondence with the TCEQ.

Attachment: Click to enter text

d. 316(b) General Criteria

i. The CWIS(s) have or will have a cumulative design intake flow of 2 MGD or greater

☒ Yes ☐ No

ii. At least 25% of the total water withdrawn by the CWIS is/will be used exclusively for cooling purposes on an annual average basis

☒ Yes ☐ No

iii. The facility withdraws/proposes to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

☒ Yes ☐ No

If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text

If **yes** to all three questions in Item 12.d, the facility is subject to 316(b). Proceed to Item 12.f.

If **no** to any of the questions in Item 12.d, the facility does not meet the minimum criteria to be subject to the full requirements of 316(b). Proceed to Item 12.e.

e. The facility is **not subject** to 316(b) **and uses/proposes to use cooling towers**.

☐ Yes ☐ No

If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1(a), 1(b)(i-iii) and (vi), 2(b)(i), and 3(a) to allow for a determination based upon BPJ.

f. Phase I vs Phase II Facilities

i. Existing facility (Phase II)

☒ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable. Otherwise, continue.

ii. New Facility – (Phase I)

☐ Yes ☐ No

If **yes**, check the box next to the facility's compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2:

☐ Track I - AIF greater than 2 MGD, but less than 10 MGD
- Attach information required by *40 CFR §§ 125.86(b)(2)-(4)*.

☐ Track I - AIF greater than 10 MGD
- Attach information required by *40 CFR § 125.86(b)*.

☐ Track II

- Attach information required by *40 CFR § 125.86(c)*.

Attachment: Click to enter text

NOTE: Item 13 is required only for existing permitted facilities.

13. PERMIT CHANGE REQUESTS (Instructions, Pages 43-44)

a. Is the facility requesting a **major amendment** of an existing permit?

☐ Yes ☒ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

Click to enter text.

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and discuss the requested changes.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and discuss the requested changes.

Click to enter text.

WORKSHEET 1.0
EPA CATEGORICAL EFFLUENT GUIDELINES

This worksheet **is required** for all applications for TPDES permits for discharges of wastewaters subject to EPA categorical effluent limitation guidelines (ELGs).

1. CATEGORICAL INDUSTRIES (Instructions, Pages 47-48)

Is this facility subject to any of the 40 CFR categorical ELGs outlined on page 52 of the instructions?

☒ Yes ☐ No

If **no**, this worksheet is not required. If **yes**, provide the appropriate information in the table below.

40 CFR Effluent Guidelines

Industry	40 CFR Part
Power Generation – Combined Cycle Generating Unites	40 CFR 423

2. PRODUCTION/PROCESS DATA (Instructions, Page 48)

a. Production Data

Provide the appropriate data for effluent guidelines with production-based effluent limitations.

Production Data

Subcategory	Actual Quantity/Day	Design Quantity/Day	Units
No production-based units			

b. Organic Chemicals, Plastics, and Synthetic Fibers Manufacturing Data (40 CFR Part 414)

Provide each applicable subpart and the percent of total production. Provide data for metal-bearing and cyanide-bearing wastestreams, as required by *40 CFR Part 414, Appendices A and B*.

Percentages of Total Production

Subcategory	Percent of Total Production	Appendix A and B - Metal	Appendix A – Cyanide
Not applicable			

Subcategory	Percent of Total Production	Appendix A and B - Metal	Appendix A – Cyanide

c. **Refineries (40 CFR Part 419)**

Provide the applicable subcategory and a brief justification.

Not applicable

3. PROCESS/NON-PROCESS WASTEWATER FLOWS (Instructions, Page 48)

Provide a breakdown of wastewater flow(s) generated by the facility, including both process and non-process wastewater flow(s). Specify which wastewater flows are to be authorized for discharge under this permit and the disposal practices for wastewater flows, excluding domestic, which are not to be authorized for discharge under this permit.

All wastewater is non-process wastewater consisting primarily of utility waste streams. No wastewater is generated from scrubbers or ash systems.

4. NEW SOURCE DETERMINATION (Instructions, Page 48)

Provide a list of all wastewater-generating processes subject to EPA categorical ELGs, identify the appropriate guideline Part and Subpart, and provide the date the process/construction commenced.

Wastewater-generating Processes Subject to Effluent Guidelines

Process	EPA Guideline: Part	EPA Guideline: Subpart	Date Process/ Construction Commenced
Power Generation	423		03/15/2001
			Operation began 10/16/2002

WORKSHEET 4.0
RECEIVING WATERS

This worksheet **is required** for all TPDES permit applications.

1. DOMESTIC DRINKING WATER SUPPLY (Instructions, Page 74)

a. There is a surface water intake for domestic drinking water supply located within 5 (five) miles downstream from the point/proposed point of discharge.

☐ Yes ☒ No

If **no**, stop here and proceed to Item 2. If **yes**, provide the following information:

i. The legal name of the owner of the drinking water supply intake: Click to enter text.

v. The distance and direction from the outfall to the drinking water supply intake: Click to enter text.

b. Locate and identify the intake on the USGS 7.5-minute topographic map provided for Administrative Report 1.0.

☐ Check this box to confirm the above requested information is provided.

2. DISCHARGE INTO TIDALLY INFLUENCED WATERS (Instructions, Page 74)

If the discharge is to tidally influenced waters, complete this section. Otherwise, proceed to Item 3.

a. Width of the receiving water at the outfall: **500** feet

b. Are there oyster reefs in the vicinity of the discharge?

☐ Yes ☒ No

If **yes**, provide the distance and direction from the outfall(s) to the oyster reefs: Click to enter text.

c. Are there sea grasses within the vicinity of the point of discharge?

☐ Yes ☒ No

If **yes**, provide the distance and direction from the outfall(s) to the grasses: Click to enter text.

3. CLASSIFIED SEGMENT (Instructions, Page 74)

The discharge is/will be directly into (or within 300 feet of) a classified segment.

☒ Yes ☐ No

If **yes**, stop here. It is not necessary to complete Items 4 and 5 of this worksheet or Worksheet 4.1.

If **no**, complete Items 4 and 5 and Worksheet 4.1 may be required.

WORKSHEET 11.0
COOLING WATER SYSTEM INFORMATION

This worksheet **is required** for all TPDES permit applications **that meet the conditions outlined in Technical Report 1.0, Item 12.**

1. COOLING WATER SYSTEM DATA (Instructions, Pages 99-100)

a. Complete the following table with information regarding the cooling water system.

Cooling Water System Data

Total DIF	10.6 MGD
Total AIF	6 MGD
Intake Flow Uses (%)	
Contact cooling	0
Non-contact cooling	64
Process uses	36
Other	

b. Attach the following information:

i. A narrative description of the design and annual operation of the facility's cooling water system and its relationship to the CWIS(s).

ii. A scaled map depicting the location of each CWIS, impoundment, intake pipe, and canals, pipes, or waterways used to convey cooling water to, or within, the cooling water system. Provide the latitude and longitude for each CWIS and any intake pipe(s) on the map. Indicate the position of the intake pipe within the water column.

iii. A description of water reuse activities, if applicable, reductions in total water withdrawals, if applicable, and the proportion of the source waterbody withdrawn (on a monthly basis).

iv. Design and engineering calculations prepared by a qualified professional and data to support the information provided in above item a.

v. Previous year (a minimum of 12 months) of AIF data.

vi. A narrative description of existing or proposed impingement and entrainment technologies or operation measures and a summary of their performance, including, but not limited to, reductions in impingement mortality and entrainment due to intake location and reductions in total water withdrawals and usage.

Attachment: H, Section H.1.1

2. COOLING WATER INTAKE STRUCTURE(S) DATA (Instructions, Page 100)

a. Complete the following table with information regarding each cooling water intake structure (this includes primary and make-up CWIS(s)).

Cooling Water Intake Structure(s) Data

CWIS ID	1			
DIF	10.6			
AIF	6			
Intake Flow Uses (%)				
Contact cooling	0			
Non-contact cooling	64			
Process uses	36			
Other				
Latitude	27.817549			
Longitude	-97.430477			

b. Attach the following information regarding the CWIS(s):

i. A narrative description of the configuration of each CWIS, annual and daily operation, including any seasonal changes, and where it is located in the water body and in the water column.

ii. Engineering calculations for each CWIS.

Attachment: H, Section H.1.2

3. SOURCE WATER PHYSICAL DATA (Instructions, Pages 100-101)

a. Complete the following table with information regarding the CWIS(s) source waterbody (this includes primary and make-up CWIS(s)).

Source Waterbody Data

CWIS ID	1			
Source waterbody	Corpus Christi Inner Harbor			
Mean annual flow	6 MGD			
Source	Annual TX Water Use Survey			

b. Attach the following information regarding the source waterbody.

i. A narrative description of the source water for each CWIS, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports this determination of the water body type where each cooling water intake structure is located.

ii. A narrative description of the source waterbody's hydrological and geomorphological features.

iii. Scaled drawings showing the physical configuration of all source water bodies used by the facility, including the source waterbody's hydrological and geomorphological features. **NOTE:** The source waterbody's hydrological and geomorphological features may be included on the map submitted for item 1.b.ii of this worksheet.

iv. A description of the methods used to conduct any physical studies to determine the intake's area of influence within the waterbody and the results of such studies.

Attachment: H, Section H.1.3

4. OPERATIONAL STATUS (Instructions, Pages 104-105)

a. Is this application for a power production or steam generation facility?

☒ Yes ☐ No

If **no**, proceed to Item 4.b. If **yes**, provide the following information as an attachment:

i. Describe the operating status of each individual unit, including age, capacity utilization rate (or equivalent) for the previous five years (a minimum of 60 months), and any seasonal changes in operation.

ii. Describe any extended or unusual outages or other factors which significantly affect current data for flow, impingement, entrainment.

iii. Identify any operating unit with a capacity utilization rate of less than 8 percent averaged over a contiguous period of two years (a minimum of 24 months).

iv. Describe any major upgrades completed within the last 15 years, including but not limited to boiler replacement, condenser replacement, turbine replacement, or changes of fuel type.

Attachment: H.1.4

b. Process Units

i. Is this application for a facility which has process units that use cooling water (other than for power production or steam generation)?

☐ Yes ☒ No

If **no**, proceed to Item 4.c. If **yes**, continue.

ii. Does the facility use or intend to use reductions in flow or changes in operations to meet the requirements of *40 CFR § 125.94(c)*?

☐ Yes ☐ No

If **no**, proceed to Item 4.c. If **yes**, attach descriptions of the following information:

- Individual production processes and product lines
- The operating status, including age of each line and seasonal operation
- Any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors
- Any major upgrades completed within the last 15 years and plans or schedules for decommissioning or replacement of process units or production processes and product lines.

Attachment: Click to enter text.

c. Is this an application for a nuclear power production facility?

☐ Yes ☒ No

If **no**, proceed to Item 4.d. If **yes**, attach a description of completed, approved, or scheduled upgrades and the Nuclear Regulatory Commission relicensing status for each unit at the facility.

Attachment: Click to enter text.

d. Is this an application for a manufacturing facility?

☐ Yes ☒ No

If **no**, proceed to Worksheet 11.1. If **yes**, attach descriptions of current and future production schedules and any plans or schedules for any new units planned within the next five years (a minimum of 60 months)

Attachment: Click to enter text.

WORKSHEET 11.1
IMPINGEMENT MORTALITY

This worksheet **is required** for all TPDES permit applications that **meet the conditions outlined in Technical Report 1.0, Item 12**. Complete one copy of this worksheet for **each** individual CWIS the facility uses or proposes to use.

CWIS ID: 1

1. IMPINGEMENT COMPLIANCE TECHNOLOGY SELECTION (Instructions, Page 102)

Check the box next to the method of compliance for the Impingement Mortality Standard selected by the facility.

☒ Closed-cycle recirculating system(CCRS) [*40 CFR § 125.94(c)(1)*]

☐ 0.5 ft/s Through-Screen Design Velocity [*40 CFR § 125.94(c)(2)*] – Proceed to Worksheet 11.2

☐ 0.5 ft/s Through Screen Actual Velocity [*40 CFR § 125.94(c)(3)*]

☐ Existing offshore velocity cap [*40 CFR § 125.94(c)(4)*] – Proceed to Worksheet 11.2

☐ Modified traveling screens [*40 CFR § 125.94(c)(5)*]

☐ System of technologies [*40 CFR § 125.94(c)(6)*]

☐ Impingement mortality performance standard [*40 CFR § 125.94(c)(7)*]

☐ De minimis rate of impingement [*40 CFR § 125.94(c)(11)*]

☐ Low capacity utilization power-generation facilities [*40 CFR § 125.94(c)(12)*]

If 0.5 ft/s Through-Screen Design Velocity [*40 CFR § 125.94(c)(2)*] or existing offshore velocity cap [*40 CFR § 125.94(c)(4)*] was selected, proceed to Worksheet 11.2. Otherwise, continue to Item 2.

2. IMPINGEMENT COMPLIANCE TECHNOLOGY INFORMATION (Instructions, Pages 102-103)

Complete the following sections based on the selection made for item 1 above.

a. CCRS [*40 CFR § 125.94(c)(1)*]

☒ Check this box to confirm the CWS meets the definition of CCRS located at *40 CFR § 125.91(c)* and provide a response to the following questions.

i. Does the facility use or propose to use a CWIS to replenish water losses to the CWS?

☒ Yes ☐ No

If **no**, proceed to item a.ii. If **yes**, provide the following information as an attachment and continue.

1. CWIS ID
2. 12 months of intake flow data for any CWIS used for make-up intake flows to replenish cooling water losses, excluding intakes for losses due to blowdown, drift, or evaporation.
3. A narrative description of any physical or operational measures taken to minimize make-up withdraws.

Attachment: Attachment H, Section H.2

NOTE: Do not complete a separate Worksheet 11.1 for a make-up CWIS.

ii. Does the facility use or propose to use cooling towers?

☒ Yes ☐ No

If **no**, proceed to Worksheet 11.2. If **yes**, provide the following information and proceed to Worksheet 11.2.

1. Average number of COCs prior to blowdown:

Average COCs prior to blowdown

Cooling Tower ID	1			
COCs	1.5			

2. Attach COC monitoring data for each cooling tower from the previous year (a minimum of 12 months)

Attachment: Appendix H-2, Table H-1

3. Maximum number of COCs each cooling tower can accomplish based on design of the system.

Calculated COCs prior to blowdown

Cooling Tower ID	1			
COCs	Not specifically identified			

4. Describe conditions that may limit the number of COCs prior to blowdown, if any, including but not limited to permit conditions: The salinity in salt water minimizes the number of cycles that can be obtained.

b. 0.5 ft/s Through Screen Actual Velocity [*40 CFR § 125.94(c)(3)*]

Provide daily intake flow measurement monitoring data from the previous year (a minimum of 12 months) as an attachment and proceed to Worksheet 11.2.

Attachment: Click to enter text

c. Modified traveling screens [*40 CFR § 125.94(c)(5)*]

Provide the following information as an attachment and proceed to Worksheet 11.2.

i. A description of the modified traveling screens and associated equipment.

ii. A site-specific impingement technology performance optimization study that includes a narrative description of the biological data collection methods

iii. Biological sampling data from the previous two years (a minimum of 24 months).

Attachment: Click to enter text

d. System of technologies [*40 CFR § 125.94(c)(6)*] or impingement mortality performance standard [*40 CFR § 125.94(c)(7)]*

Provide the following information as an attachment and proceed to Worksheet 11.2.

i. A description of the system of technologies used or proposed for use by the facility to achieve compliance with the impingement mortality standard.

ii. A site-specific impingement technology performance optimization study that includes a narrative description of the biological data collection methods.

iii. Biological sampling data from the previous two years (a minimum of 24 months).

Attachment: Click to enter text.

e. De minimis rate of impingement [*40 CFR § 125.94(c)(11)*]

Provide the following information and proceed to Worksheet 11.2.

i. Attach monitoring data from the previous year (a minimum of 12 months) of intake flow measured at a frequency of 1/day on days of operation.

Attachment: Click to enter text.

ii. If the rate of impingement caused by the CWIS is extremely low (at an organism or age-one equivalent count), attach supplemental information to Worksheet 11.0, item 1.b.vi. to support this determination.

Attachment: Click to enter text.

f. Low capacity utilization power-generation facilities [*40 CFR § 125.94(c)(12)*]

Attach monthly utilization data from the previous 2 years (a minimum of 24 months) for each operating unit and proceed to Worksheet 11.2.

Attachment: Click to enter text.

WORKSHEET 11.2
SOURCE WATER BIOLOGICAL DATA

This worksheet **is required** for all TPDES permit applications that **meet the conditions outlined in Technical Report 1.0, Item 12**. Complete one copy of this worksheet for **each** source waterbody of a CWIS for which a facility has selected an Impingement Mortality Technology Option described at *40 CFR §§ 125.94(c)(1)-(7)*.

Name of source waterbody: Corpus Christi Ship Channel

1. SPECIES MANAGEMENT (Instructions, Page 104)

a. The facility has obtained an incidental take permit for its cooling water intake structure(s) from the USFWS or the NMFS.

☐ Yes ☒ No

If yes, attach any information submitted in order to obtain that permit, which may be used to supplement the permit application information requirements of paragraph *40 CFR § 125.95(f)*.

Attachment: Click to enter text

b. Is the facility requesting a waiver from application requirements at *40 CFR § 122.21(r)(4)* in accordance with *40 CFR § 125.95* for any CWIS(s) that withdraw from a man-made reservoir that is stocked and managed by a state or federal natural resources agency or the equivalent?

☐ Yes ☒ No

If **yes**, attach a copy of the most recent managed fisheries report to TPWD, or equivalent.

Attachment: Click to enter text

c. There are no federally listed threatened or endangered species or critical habitat designations within the source water body.

☐ True ☒ False

2. SOURCE WATER BIOLOGICAL DATA (Instructions, Pages 104-105)

New Facilities (Phase I, Track I and II)

- Provide responses to all items in this section and stop.

Existing Facilities (Phase II)

- If the answer to **1.b.** above was **no**, provide responses to all items in this section and proceed to Worksheet 11.3.
- If the answer to **1.b.** was **yes** and **1.c.** was **true**, do not complete any items in this section and proceed to Worksheet 11.3.
- If the answer to **1.b.** was **yes** and **1.c.** was **false**, attach a response for any item in this section that is not contained within the most recent TPWD, or equivalent and proceed to Worksheet 11.3.

Attachment: I

a. A list of the data requested at *40 CFR § 122.21(r)(4)(ii)* through *(vi)* that are not available, and efforts made to identify sources of the data.

b. Provide a list of species (or relevant taxa) in the vicinity of the CWIS and identify the following information regarding each species listed.

- all life stages and their relative abundance,
- identification of all species and life stages that would be most susceptible to impingement and entrainment,
- forage base,
- significance to commercial fisheries,
- significance to recreational fisheries,
- primary period of reproduction,
- larval recruitment, and
- period of peak abundance for relevant taxa.

c. Data representative of the seasonal and daily activities (e.g., feeding and water column migration) of biological organisms in the vicinity of the CWIS(s).

d. Identify all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at the CWIS(s).

e. Documentation of any public participation or consultation with federal or state agencies undertaken.

The following is required for existing facilities only. Include the following information with the above listed attachment.

f. Identify any protective measures and stabilization activities that have been implemented and provide a description of how these measures and activities affected the baseline water condition in the vicinity of the intake.

g. A list of fragile species, as defined at *40 CFR § 125.92(m)*, at the facility. The applicant need only identify those species not already identified as fragile at *40 CFR § 125.92(m)*.

NOTE: New units at an existing facility are not required to resubmit this information if the cooling water withdrawals for the operation of the new unit are from an existing intake.

WORKSHEET 11.3
ENTRAINMENT

This worksheet **is required** for all TPDES permit applications that **meet the conditions outlined in Technical Report 1.0, Item 12**. Complete one copy of this worksheet for **each** individual CWIS the facility uses or proposes to use.

CWIS ID: 1

1. APPLICABILITY (Instructions, Page 106)

Is the AIF of the CWIS identified above greater than, or equal to, 125 MGD?

☐ Yes ☒ No

- If **no** or the facility has selected **CCRS** [*40 CFR § 125.94(c)(1)*] for the impingement mortality compliance method, complete Item 2 and stop here.
- If **yes** and the facility is **seeking a waiver** from application requirements in accordance with *40 CFR § 125.95* for any CWIS(s) that withdraw from a man-made reservoir that is stocked and managed by a state or federal natural resources agency or the equivalent, complete item 2 and stop.
- If **yes** and the facility is **not seeking a waiver** from application requirements in accordance *with 40 CFR § 125.95*, complete item 2 and provide any required and completed studies listed in item 3. For any required studies in item 3 that are not complete, provide a detailed explanation for the delay and an anticipated schedule for completion and submittal.

2. EXISTING ENTRAINMENT PERFORMANCE STUDIES (Instructions, Page 106)

Attach any previously conducted studies or studies obtained from other facilities addressing technology efficacy, through-facility entrainment survival, and other entrainment studies.

Attachment: None

3. FACILITY ENTRAINMENT PERFORMANCE STUDIES (Instructions, Page 106)

a. Attach an entrainment characterization study, as described at *40 CFR § 122.21(r)(9)*.

Attachment: Click to enter text

b. Attach a comprehensive feasibility study, as described as *40 CFR § 122.21(r)(10)*.

Attachment: Click to enter text

c. Attach a benefits valuation study, as described as *40 CFR § 122.21(r)(11)*.

Attachment: Click to enter text

d. Attach a non-water quality environmental and other impacts study, as described as *40 CFR § 122.21(r)(12)*.

Attachment: Click to enter text

e. Attach a peer review analysis, as described as *40 CFR § 122.21(r)(13)*.

Attachment: Click to enter text

ATTACHMENT A

COPY OF FEE PAYMENT

717 TEXAS AVENUE, SUITE 1000
HOUSTON, TX 77002

CALPINE CORPORATION

November 21, 2019

via FedEx

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC 214
12100 Park 35 Circle
Austin, TX 78753

Re: TPDES Renewal Application WQ0004158-000
RN 100224302 Corpus Christi Cogeneration
CN 600131726 Corpus Christi Cogeneration, LLC
CN 602680076 Calpine Operating Services Company, Inc.
Fee Submittal

To Whom it May Concern:

Corpus Christi Cogeneration hereby submits the enclosed check as payment of the $2,015 fee associated with the above referenced TPDES permit renewal submittal. Please find enclosed Check Number 1000113982 and a Water Quality Permit Payment Submittal Form.

If you require any additional information or have any questions, please contact me at (713) 570-4814 or Ms. Nancy Koch, P.E. of Weston Solutions, Inc. at (512) 651-7104.

Sincerely,
Calpine Corporation

Jan Stavinoha

Jan Stavinoha, P.E.
Manager, EHS

Enclosure

cc: Mr. Andy McDonald, Plant Manager, Corpus Christi Cogeneration (via email)
Ms. Nancy Koch, P.E., Project Manager, Weston Solutions, Inc. (via email)

WATER QUALITY PERMIT

PAYMENT SUBMITTAL FORM

Use this form to submit the Application Fee, if mailing the payment.

- Complete items 1 through 5 below.
- Staple the check or money order in the space provided at the bottom of this document.
- Do not mail this form with the application form.
- Do not mail this form to the same address as the application.
- Do not submit a copy of the application with this form as it could cause duplicate permit entries.

Mail this form and the check or money order to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, Texas 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, Texas 78753

Fee Code: WQP **Permit No: WQ0004158000**

1. Check or Money Order Number: 1000113982
2. Check or Money Order Amount: 2,015.00
3. Date of Check or Money Order: 11/21/2019
4. Name on Check or Money Order: Calpine Oper Services Co, Inc.
5. APPLICATION INFORMATION

   Name of Project or Site: Corpus Christi Cogeneration

   Physical Address of Project or Site: 3952 Buddy Lawrence Drive, Corpus Christi, Texas, 78407

   If the check is for more than one application, attach a list which includes the name of each Project or Site (RE) and Physical Address, exactly as provided on the application.

Staple Check or Money Order in This Space

Check Date: Nov/21/2019 **Vendor Number:** 0000026963 **Check No.** 1000113982

Invoice Number	Invoice Date	Voucher ID	Gross Amount	Discount Taken	Late Charge	Paid Amount
269631119A	Nov/21/2019	00679101	2,015.00	0.00	0.00	2,015.00
JAN STAVINOHA WILL PICK UP CHECK						

Check Number	Date	Total Gross Amount	Total Discounts	Total Late Charges	Total Paid Amount
1000113982	Nov/21/2019	$2,015.00	$0.00	$0.00	$2,015.00

CALPINE

CALPINE OPER SERVICES CO, INC.
717 Texas Avenue
Houston, TX 77002-2712

90-4150/1222
9080015043

Check Number
1000113982

DATE Nov/21/2019

****TWO THOUSAND AND FIFTEEN AND XX / 100 DOLLAR**** **$2,015.00***

PAY TO THE ORDER OF
TEXAS COMMISSION ON ENVIRONMENTAL QUAL
PO BOX 13087
AUSTIN, TX 78711-3087

Authorized Signature

MUFG UNION BANK, N.A.
San Francisco, CA

⑈1000113982⑈ ⑆122241501⑆ 9080015043⑈

1. Print the label: Select the print icon in your PDF Reader window to print the label.

2. Fold the printed label at the dotted line. Place the label in a FedEx Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. Getting your shipment to FedEx

Customers without a Daily Pickup

Take this package to any FedEx Store location and drop it off with your label attached.

Air shipments can be picked up or dropped off. To schedule a pickup, or to find a drop-off location, select the Pickup or Drop-off icon from the FedEx tool bar.

Customers with a Daily Pickup

Your driver will pickup your shipment(s) as usual.

ORIGIN ID:EIXA (713) 332-5167
LAURA WAKE
CALPINE CORPORATE
717 TEXAS AVE
SUITE 1000
HOUSTON, TX 77002
UNITED STATES US

SHIP DATE: 21NOV19
ACTWGT: 1.00 LB
CAD: 100844866/WSX12300

BILL THIRD PARTY

TO CASHIERS OFFICE MC214
TCEQ
12100 PARK 35 CIR

AUSTIN TX 78753

(713) 332-5167
INV AR6314-50464
PO

REF 10000 1002

DEPT

FedEx Express

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567J1/F330/05A2

FRI - 22 NOV 10:30A
PRIORITY OVERNIGHT

TRK# 0201 7782 1366 8965

A8 MMRA

78753
AUS
TX-US

ATTACHMENT B

CORE DATA FORMS

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided.)*

☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.)*

☒ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number *(if issued)*
CN **600131726**		RN **100224302**

SECTION II: Customer Information

4. General Customer Information | 5. Effective Date for Customer Information Updates (mm/dd/yyyy)

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)* *If new Customer, enter previous Customer below:*

Corpus Christi Cogeneration, L.L.C.

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
125856-11	13643370409		

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☒ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☒ Yes ☐ No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following:*

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:							
	717 Texas Avenue						
	Suite 1000						
	City	Houston	State	TX	ZIP	77002	ZIP + 4

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*
	patrick.blanchard@calpine.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(713) 830-8717		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☒ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC.)

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Corpus Christi Cogeneration

23. Street Address of the Regulated Entity: *(No PO Boxes)*	3952 Buddy Lawrence Drive							
	City	Corpus Christi	State	TX	ZIP	78407	ZIP + 4	
24. County	Harris							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:					
26. Nearest City			State	Nearest ZIP Code	
Corpus Christi			TX	78407	
27. Latitude (N) In Decimal:			28. Longitude (W) In Decimal:		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
27	48	51.59	-97	25	41.40

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)
4911		221112	221119

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Power Generation

34. Mailing Address:	717 Texas Avenue							
	Suite 1000							
	City	Houston	State	TX	ZIP	77002	ZIP + 4	
35. E-Mail Address:	patrick.blanchard@calpine.com							

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
(713) 830-8717		( ) -

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Nancy Koch	41. Title:	Project Manager
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(512) 651-7104		( ) -	nancy.koch@westonsolutions.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Corpus Christi Cogeneration	Job Title:	Director EHS
Name*(In Print)* :	Patrick Blanchard	Phone:	(713) 830-8717
Signature:		Date:	11-20-19

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided.)*

☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.)*

☒ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number *(if issued)*
CN **602680076**		RN **100224302**

SECTION II: Customer Information

4. General Customer Information | 5. Effective Date for Customer Information Updates (mm/dd/yyyy)

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)* *If new Customer, enter previous Customer below:*

Calpine Operating Services Company, Inc.

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
800146045	17108874284	880212977	

11. Type of Customer: ☒ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher

13. Independently Owned and Operated?
☒ Yes ☐ No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following:*

☐ Owner ☒ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:							
	717 Texas Avenue						
	Suite 1000						
	City	Houston	State	TX	ZIP	77002	ZIP + 4

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*
	patrick.blanchard@calpine.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(713) 830-8717		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☒ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC.)

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Corpus Christi Cogeneration

23. Street Address of the Regulated Entity: *(No PO Boxes)*	3952 Buddy Lawrence Drive							
	City	Corpus Christi	State	TX	ZIP	78407	ZIP + 4	
24. County	Harris							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:					
26. Nearest City			State	Nearest ZIP Code	
Corpus Christi			TX	78407	
27. Latitude (N) In Decimal:			28. Longitude (W) In Decimal:		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
27	48	51.59	-97	25	41.40

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)
4911		221112	221119

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Power Generation

34. Mailing Address:	717 Texas Avenue							
	Suite 1000							
	City	Houston	State	TX	ZIP	77002	ZIP + 4	
35. E-Mail Address:	patrick.blanchard@calpine.com							
36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*						
(713) 830-8717		( ) -						

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Nancy Koch	41. Title:	Project Manager
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(512) 651-7104		( ) -	nancy.koch@westonsolutions.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Calpine Operating Services Company, Inc.	Job Title:	Director EHS
Name*(In Print)* :	Patrick Blanchard	Phone:	(713) 830-8717
Signature:		Date:	11-20-19

ATTACHMENT C

LEASE AGREEMENT

MEMORANDUM OF FIRST AMENDMENT OF PROJECT SITE LEASE AGREEMENT

This Memorandum of First Amendment of Project Site Lease Agreement is entered into effective the _24th_ day of August, 2001 by and between CITGO REFINING AND CHEMICALS COMPANY L.P., a Delaware limited liability partnership ("CITGO") and CORPUS CHRISTI COGENERATION LP, a Delaware limited partnership ("CCC"), for the purposes of recording.

1. CITGO, as Lessor, and CCC, as Lessee Lessor have entered into that certain Project Site Lease Agreement, dated as of June 21, 1999, as assigned to Lessee by Nueces Bay Energy LLC, a Delaware limited liability company, on October 14, 1999 (as the same may be amended, modified or supplemented from time to time, the "Lease"), relating to the Corpus Christi Energy Center located in Nueces County, Texas more particularly described in the Memorandum of Lease dated June 21, 1999 and recorded on July 13, 1999 under Document No. 1999030778 in the Official Public Records of Nueces County, Texas.

2. CITGO, as Lessor, and CCC, as Lessee, have as of August 24, 2001 entered into a First Amendment of Project Site Lease Agreement whereby the parties modified the Lease in certain respects to clarify certain of their obligations thereunder.

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of First Amendment of Project Site Lease Agreement this 19 TH day of September, 2001.

LESSEE:	LESSOR:
CORPUS CHRISTI COGENERATION LP, a Delaware limited partnership	CITGO REFINING AND CHEMICALS COMPANY, L.P., a Delaware limited partnership
By: R Regan for	By: Robert J. Kostelnik MED
Name: ROBERT REGAN	Name: ROBERT J. KOSTELNIK
Its: VICE PRESIDENT	Its: PRESIDENT

STATE OF TEXAS)

COUNTY OF NEUCES)

This instrument was acknowledged before me on September 19, 2001 by Robert J. Kostelnik as President of CITGO REFINING AND CHEMICALS COMPANY, L.P. a Delaware limited partnership, on behalf of such partnership.

(Personalized Seal)

JANIE GONZALEZ
MY COMMISSION EXPIRES
July 19, 2005

Notary Public, State of Texas

My Commission expires: July 19, 2005

STATE OF TEXAS)

COUNTY OF HARRIS)

This instrument was acknowledged before me on SEPTEMBER 21ST, 2001 by ROBERT REGAN as VICE PRESIDENT of CORPUS CHRISTI COGENERATION, L.P. a Delaware limited partnership, on behalf of such partnership.

(Personalized Seal)

DEBRA LOE
Notary Public, State of Texas
My Commission Expires
May 20, 2004

Notary Public, State of Texas

My Commission expires: MAY 20, 2004

2739

MEMORANDUM OF LEASE

This Memorandum of Lease is entered into this 21 day of June, 1999 by and between CITGO REFINING AND CHEMICALS COMPANY L.P., a Delaware Limited Partnership, ("CITGO") and Nueces Bay Energy LLC, a Delaware Limited Liability Company, ("NUECES"), for the purpose of recording.

1. CITGO, as Lessor, and NUECES, as Lessee, have as of June 21, 1999 entered into a Lease Agreement (the "Lease") whereby CITGO has leased to NUECES certain real property (as more fully described on Exhibit A attached hereto and incorporated herein by reference) located in Nueces County, Texas for the construction, ownership and operation of an electrical power and steam generation facility.

2. The Initial Term of the Lease is for a period commencing on the date hereof and expiring forty (40) years after the "Initial Delivery Date (IDD) as defined in the Lease", contemplated to be on or about November 2001.

3. Lessee has the right to extend the term of the Lease for two additional five (5) year terms.

IN WITNESS WHEREOF, the parties hereto have hereunto executed this Memorandum of Lease this 21 day of June, 1999.

LESSEE:
Nueces Bay Energy LLC
By it Managing Member SkyGen Energy LLC

By: [signature]

Name: JAMES J. SHIELD

Title: Vice President - Engineering

LESSOR:
CITGO REFINING AND CHEMICALS COMPANY, L.P.

By: Bruce P. Beck

Name: Bruce P. Beck

Title: Acting Refinery Manager

MED

STATE OF ILLINOIS)

) SS.

COUNTY OF COOK)

This instrument was acknowledged before me on June 21, 1999, by James Shield as Vice President of SkyGen Energy LLC, a Delaware limited liability company, on behalf of such limited liability company.

(Personalized Seal)

"OFFICIAL SEAL"
BIANCA VIRGILI
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 5/2/2001

Bianca Virgili

Notary Public, State of Illinois

My Commission expires:

May 2, 2001

STATE OF TEXAS)

) SS.

COUNTY OF NUECES)

This instrument was acknowledged before me on June 21, 1999,
By Bruce P. Beck as Acting Refinery Mgr of CITGO Refining and Chemicals Company, L. P., a Delaware Limited Partnership, on behalf of such limited partnership.

(Personalized Seal)

ALMA E. RAMON
MY COMMISSION EXPIRES
February 19 2001

Alma E. Ramon

Notary Public, State of Texas

My Commission expires:

2-19-2001

EXHIBIT A

PROJECT SITE

METES AND BOUNDS
DESCRIPTION OF
9.10 ACRES OF LAND

BEING 9.10 acres of land, more or less, out of that 60.89 acre tract of land conveyed to Champlin Refining and Chemicals, Inc. by PPG Industries, Inc. and recorded in Clerks's File No. 693049 of the Official Public Records of Nueces County, Texas and also being out of the "Rincon Del Oso" Enriquez Villareal Survey, A-1 said 9.10 acre tract, as shown in the attached "EXHIBIT A", being more particularly described as follows;

BEGINNING at a found 5/8 inch iron rod in the north line of the Union Pacific Railroad for the southwest corner of the aforesaid 60.89 acre tract and the southeast corner of a 39.62 acre tract as described in Clerk's File No. 693054 of the Official Public Records of Nueces County, Texas;

THENCE, with the common line of said 60.89 acre and 39.62 acre tracts,

N 25°09'00" E	478.10 feet to a found 5/8 inch iron rod,
N 64°45'13" W	309.60 feet to a found 5/8 inch iron rod,
N 25°11'40" E	193.48 feet to a found 5/8 inch iron rod,
N 64°40'56" W	159.36 feet to a found 5/8 inch iron rod,
N 25°12'17" E	284.62 feet to a found 5/8 inch iron rod;

THENCE, leaving said common line and with the general line of an existing fence, N 26°53'15" E 42.68 feet to a steel fence corner post;

THENCE, continuing with the general line of said existing fence, S 49°49'55" E 140.00 feet to a steel fence corner post;

THENCE, leaving said fence line,

S 51°19'02" E	230.22 feet to a set 5/8 inch iron rod,
S 37°41'16" E	106.93 feet to a set 5/8 inch iron rod,
S 31°43'29" E	269.62 feet to a set 5/8 inch iron rod,
S 19°47'10" E	66.04 feet to a set 5/8 inch iron rod,
S 00°42'04" E	399.89 feet to a set 5/8 inch iron rod in the

aforesaid north line of the Union Pacific Railroad;

THENCE, with said north line and a non-tangent curve to the left having a central angle of 6°48'35", a radius of 1960.08 feet, and a chord bearing S 83°19'21" W 232.82 feet, a distance of 232.96 feet to a set 5/8 inch iron rod;

THENCE, continuing with said north line and a spiral transition curve to the left, having a degree of curvature of 3°53'50", and a chord bearing S 77°19'12" W 266.60 feet, a distance of 266.65 feet to a set 5/8 inch iron rod;

THENCE, continuing with said north line, S 76°01'15" W 32.71 feet to the POINT OF BEGINNING and containing 9.10 acres of land, more or less;

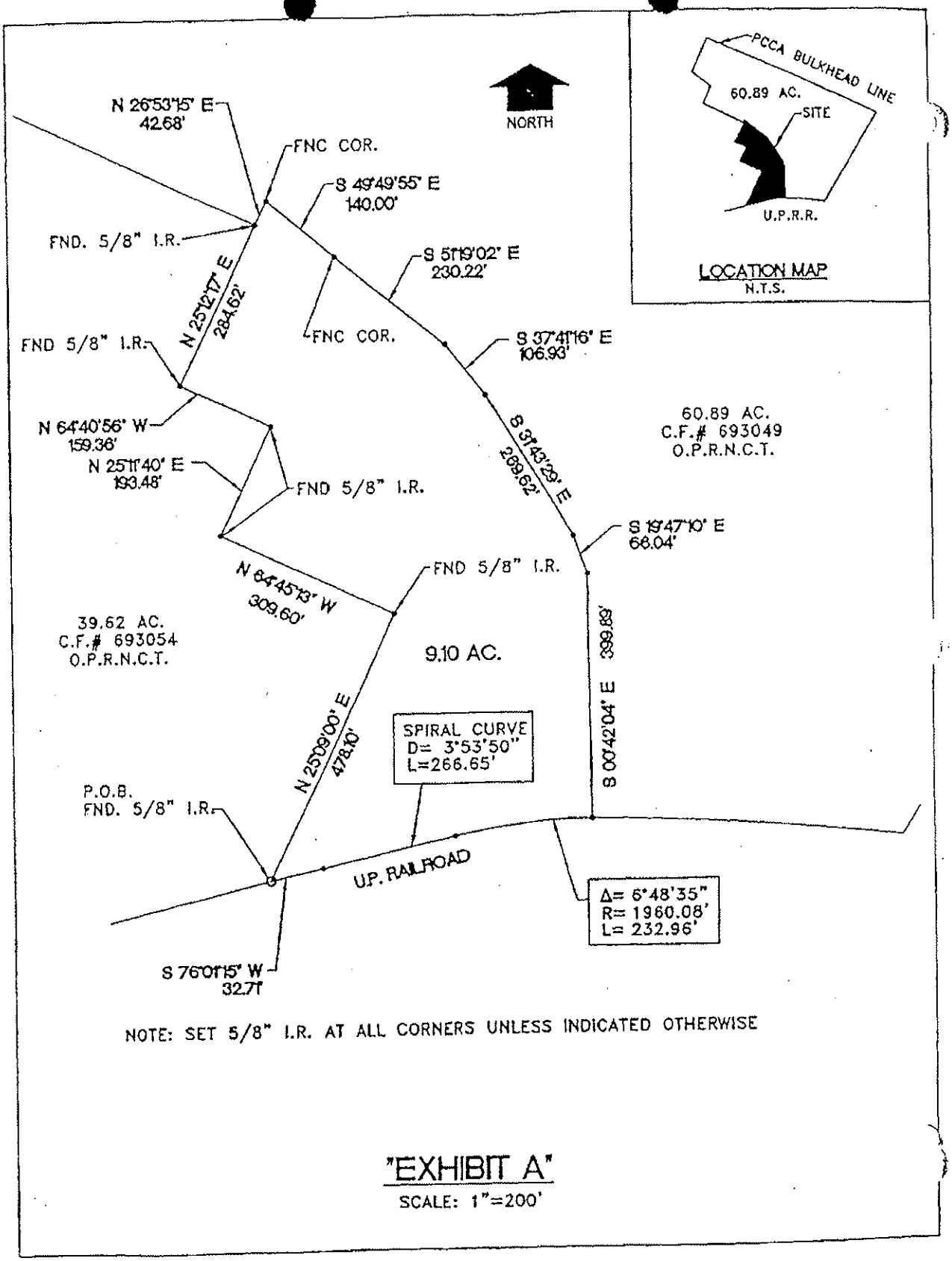
NOTE : BEARINGS ARE BASED ON THE FOUND SOUTHERLY WEST LINE OF THIS 9.10 ACRE TRACT BEARING N 25°09'00" E.

Michael D. Stridde

Michael D. Stridde
Registered Professional Land Surveyor
Texas No. 3589

6-11-99
Date

Z:\SECRETARIES\WPFILES\METES\99271-501.9.10ACRES



NOTE: SET 5/8" I.R. AT ALL CORNERS UNLESS INDICATED OTHERWISE

"EXHIBIT A"

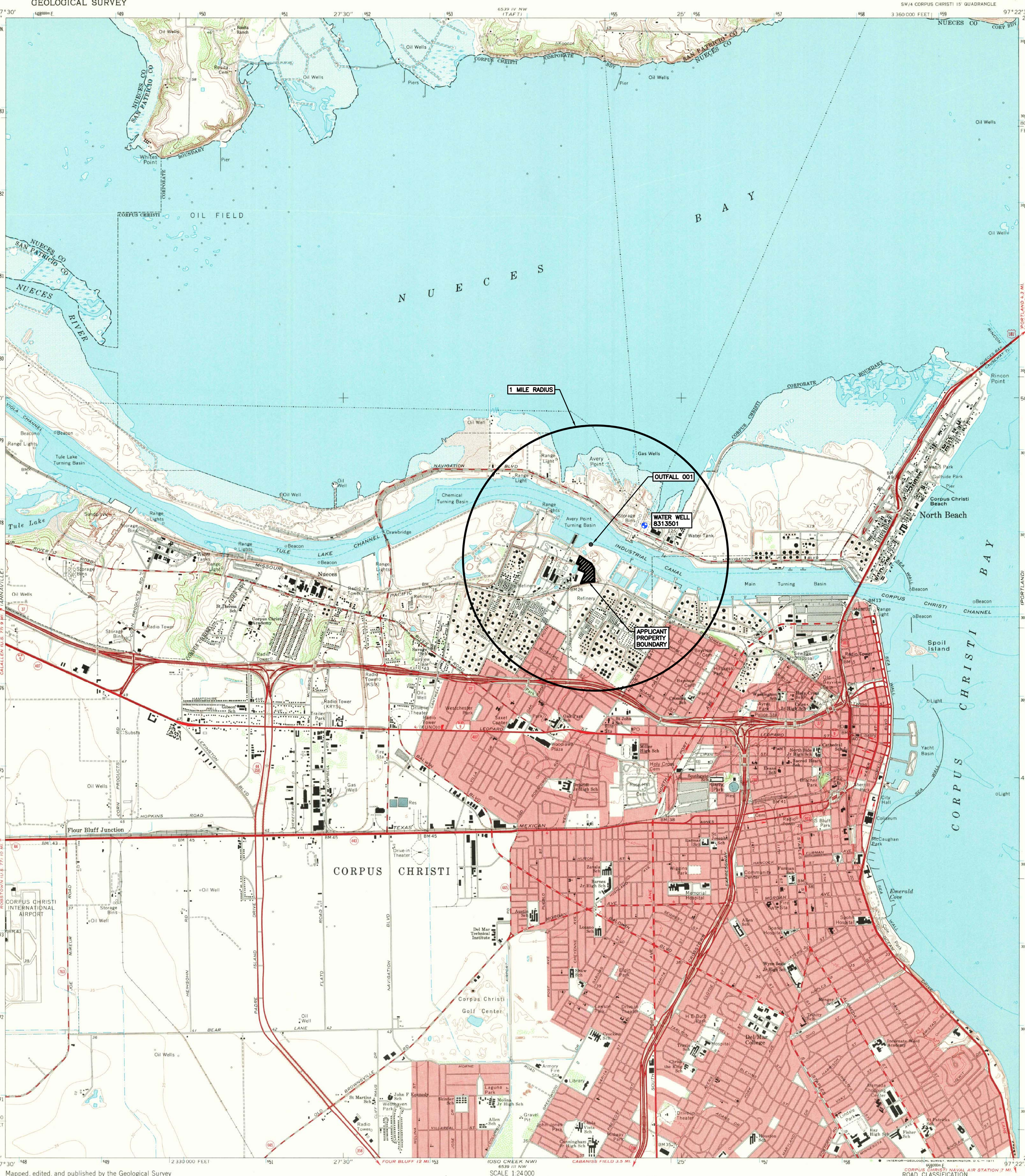
SCALE: 1"=200'

ATTACHMENT D

USGS TOPOGRAPHICAL MAP

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CORPUS CHRISTI QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 CORPUS CHRISTI 15' QUADRANGLE


1 MILE RADIUS

OUTFALL 001

WATER WELL 8313501

APPLICANT PROPERTY BOUNDARY

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1968
Supersedes Corpus Christi map dated 1951

Selected hydrographic data compiled from USC&GS chart 524 (1969)
This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Water stages in this area vary with meteorological conditions
Approximate limits of occasional inundation shown by dashed blue lines where mean high water is undetermined for lack of visual evidence

MN
GN
0°44'
13 MILS
9°
160 MILS

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS NEGLIGIBLE

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Primary highway, all weather, hard surface	Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather

Interstate Route U. S. Route State Route

TEXAS
QUADRANGLE LOCATION

U.S.G.S.
FILE COPY
TOPOGRAPHIC DIVISION

CORPUS CHRISTI, TEX.
SW/4 CORPUS CHRISTI 15' QUADRANGLE
N2745—W9722.5/7.5

1968

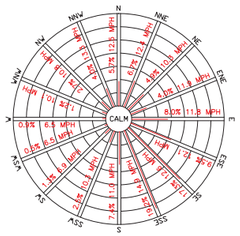
AMS 6539 IV SW—SERIES V882

3215

MAY 5 1971

ATTACHMENT E

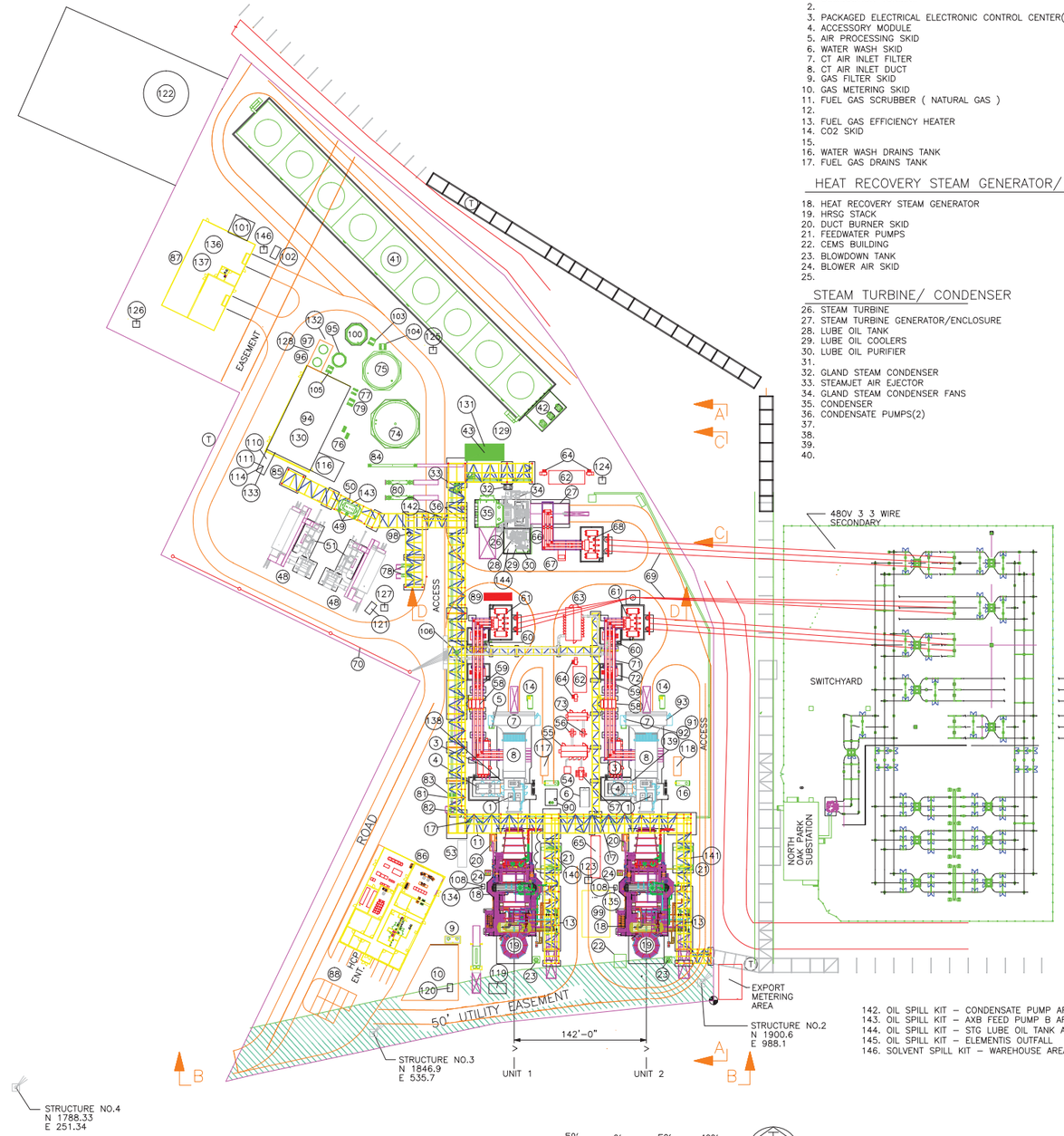
SITE MAP



TOTAL % OF WINDS
FROM INDICATED DIRECTION

NOTES:

1. ALL ELEVATIONS ARE BASED ON FINISHED GRADE ELEVATION H.P. GRADE EL. 99'-6"
2. TIE-IN POINTS, T- ◯
3. ⊕ - PLANT COORDINATES
   N. 1881.8605, E.1001.2554, EL. 95'-6"
4. STACK LOCATIONS
   UNIT 1 N. 1941.0000
   E. 787.0000
   UNIT 2 N. 1941.0000
   E. 929.0000



50' 0' 50' 100'
GRAPHIC SCALE

NORTH

COMBUSTION TURBINE(G.E.)

1. COMBUSTION TURBINE
2.
3. PACKAGED ELECTRICAL ELECTRONIC CONTROL CENTER(PEECC)
4. ACCESSORY MODULE
5. AIR PROCESSING SKID
6. WATER WASH SKID
7. CT AIR INLET FILTER
8. CT AIR INLET DUCT
9. GAS FILTER SKID
10. GAS METERING SKID
11. FUEL GAS SCRUBBER (NATURAL GAS)
12.
13. FUEL GAS EFFICIENCY HEATER
14. CO2 SKID
15.
16. WATER WASH DRAINS TANK
17. FUEL GAS DRAINS TANK

HEAT RECOVERY STEAM GENERATOR/ HRSG

18. HEAT RECOVERY STEAM GENERATOR
19. HRSG STACK
20. DUCT BURNER SKID
21. FEEDWATER PUMPS
22. CEMS BUILDING
23. BLOWDOWN TANK
24. BLOWER AIR SKID
25.

STEAM TURBINE/ CONDENSER

26. STEAM TURBINE
27. STEAM TURBINE GENERATOR/ENCLOSURE
28. LUBE OIL TANK
29. LUBE OIL COOLERS
30. LUBE OIL PURIFIER
31.
32. GLAND STEAM CONDENSER
33. STEAMJET AIR EJECTOR
34. GLAND STEAM CONDENSER FANS
35. CONDENSER
36. CONDENSATE PUMPS(2)
37.
38.
39.
40.

COOLING TOWER

41. COOLING TOWER
42. CIRCULATING WATER PUMPS(3)
43. CIRCULATING WATER CHEMICAL FEED EQUIPMENT
44.
45.
46.
47.

AUXILIARY BOILERS

48. AUXILIARY BOILERS
49. AUXILIARY BOILER FEED PUMPS(3)
50. AUXILIARY BOILER DEAERATOR
51. AUXILIARY BOILER STACK
52.

ELECTRICAL EQUIPMENT

53. EMERGENCY DIESEL GENERATOR
54. DC LINK
55. LCI/CT1 EXCITER BUILDING
56. EXCITATION TRANSFORMER
57. LCI ISOLATION TRANSFORMER
58. GENERATOR CIRCUIT BREAKER
59. NETURAL DISTRIBUTION TRANSFORMER
60. UNIT AUX. TRANSFORMER
61. COMBUSTION TURBINE MAIN POWER TRANSFORMER
62. 480V SUS
63. SWITCHGEAR
64. SUS TRANSFORMERS
65. HRSG COMMONS BUILDING
66. ST EXCITATION SWITCHGEAR
67. ST EXCITATION TRANSFORMER
68. ST MAIN POWER TRANSFORMER
69. TRANSMISSION LINES
70. TRANSMISSION LINES TO ELEMENTIS
71. ELEMENTIS FEED BREAKER
72. ELEMENTIS TRANSFORMER
73. CT2 EXCITER BUILDING

MISCELLANEOUS EQUIPMENT

74. DEMIN STORAGE TANK (568,000 GALS.)
75. CITY WATER STORAGE TANK (356,000 GALS.)
76. CONDENSATE TRANSFER PUMPS
77. SERVICE WATER PUMPS
78. CLOSED COOLING WATER PUMPS
79. REGENERATION PUMPS
80. COOLING WATER HEAT EXCHANGER
81. AIR RECEIVER
82. AIR COMPRESSORS
83. AIR DRYERS
84. SECONDARY CONDENSATE RETURN HEAT EXCHANGER
85.
86. ADMINISTRATION BUILDING
87. MAINTENANCE / SHOP
88. ADMIN. PARKING
89. OILY WATER SEPARATOR
90. WASTE WATER SUMP
91. NITROGEN MANIFOLD/ BOTTLE STORAGE
92. CO2 MANIFOLD/ BOTTLE STORAGE
93. H2 MANIFOLD/ BOTTLE STORAGE
94. WATER TREATMENT BUILDING
95. NEUTRALIZATION TANK
96. ACID TANK
97. CAUSTIC TANK
98. CLOSED COOLING WATER EXPANSION TANK
99. TEST PILE AREA
100. 60,000 GAL. CONDENSATE STORAGE TANK
101. OIL STORAGE BUILDING
102. GASOLINE / DIESEL FUEL TANK
103. MIXED BED FEED PUMPS
104. MMF BACKWASH PUMPS
105. NEUTRAIZATION PUMPS
106. PRIMARY CONDENSATE RETURN HEAT EXCHANGER
107.
108. UNIT 1 & 2 HRSG PHOSPHATE SKID
109.
110. HRSG AMINE SKID
111. AUX BOILER AMINE SKID
112.
113.
114. AUX BOILER PHOSPHATE SKID
115.
116. WATER AND STEAM SAMPLE PANEL
117. CT1 FOGGER SKID
118. CT2 FOGGER SKID
119. CT FUEL GAS REGULATING SKID
120. FUEL GAS DRAIN TANK
121. REF GAS CONDENSATE TANK
122. NATURAL GAS CONDENSATE TANK
123. HRSG AREA CATHODIC PROTECTION TRANSFORMER
124. SUS 1 AREA CATHODIC PROTECTION TRANSFORMER
125. COOLING TOWER AREA CATHODIC PROTECTION TRANSFORMER
126. WAREHOUSE AREA CATHODIC PROTECTION TRANSFORMER
127. AXB AREA CATHODIC PROTECTION TRANSFORMER
128. BULK WATER TREATMENT ACID & CAUSTIC OFFLOAD AREA
129. BULK COOLING TOWER AREA CHEMICAL OFFLOAD AREA
130. CHEMICAL SPILL KIT – WATER TREATMENT BUILDING
131. CHEMICAL SPILL KIT – COOLING TOWER CHEMICAL AREA
132. CHEMICAL SPILL KIT – WTB CHEMICAL OFFLOAD AREA
133. CHEMICAL SPILL KIT – AXB CHEMICAL PUMP SKID AREA
134. CHEMICAL SPILL KIT – CT1 PHOSPHATE SKID AREA
135. CHEMICAL SPILL KIT – CT2 PHOSPHATE SKID AREA
136. CHEMICAL SPILL KIT – IN WAREHOUSE
137. OIL SPILL KIT – IN WAREHOUSE
138. OIL SPILL KIT – CT1 ACCESSORY MODULE AREA
139. OIL SPILL KIT – CT2 ACCESSORY MODULE AREA
140. OIL SPILL KIT – HRSG 1 BFP AREA
141. OIL SPILL KIT – HRSG 2 BFP AREA
142. OIL SPILL KIT – CONDENSATE PUMP AREA
143. OIL SPILL KIT – AXB FEED PUMP B AREA
144. OIL SPILL KIT – STG LUBE OIL TANK AREA
145. OIL SPILL KIT – ELEMENTIS OUTFALL
146. SOLVENT SPILL KIT – WAREHOUSE AREA BY FUEL TANK

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	10-04-00	J. PIERZ	G.P. SWITAK	R.E. HERBSTER	RELEASED FOR DESIGN	
B	01-10-01	J.L. HENRY	G.P. SWITAK		RELEASED FOR DESIGN	
C	06-20-01	C.SCHWENN	G.P. SWITAK		RELEASED FOR DESIGN – GENERAL REVISION	

STATE OF TEXAS
BERNARD GOLDLUST
87434
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY BERNARD GOLDLUST TEXAS P.E. 87434 ON 01-10-2001

SCALE 1" = 50'

PROJECT NUMBER 10895-000

GENERAL ARRANGEMENT
PROPERTY DEVELOPMENT

CORPUS CHRISTI ENERGY CENTER
CORPUS CHRISTI
COGENERATION LP

FILE I.D. M003 01.DGN

Sargent & Lundy LLC

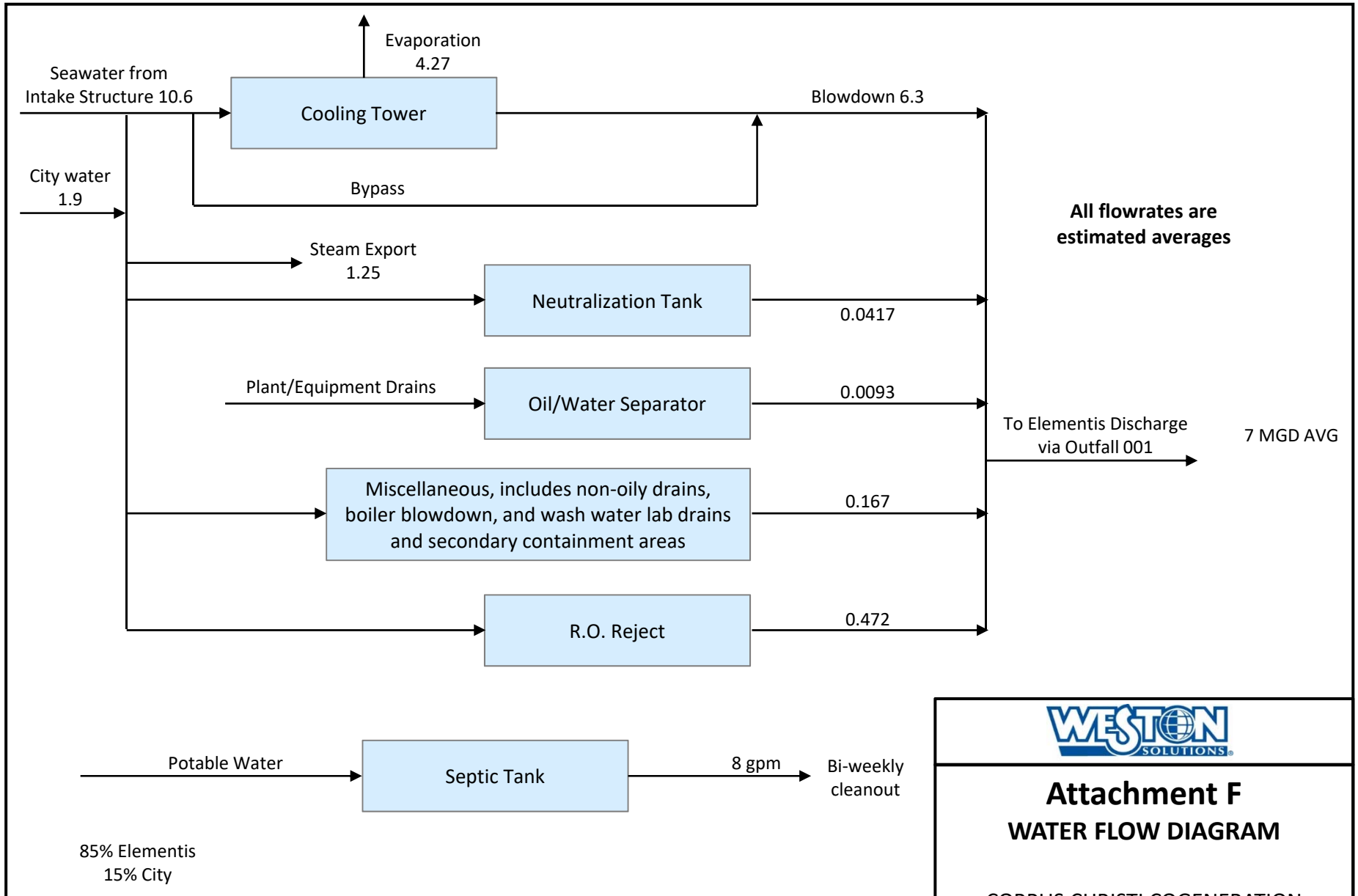
DRAWING NO. M-003 REV. C

SHEET OF

FORM 020 2.4.1 REV. 1 (06/00)

ATTACHMENT F

FLOW DIAGRAM



WESTON SOLUTIONS

Attachment F

WATER FLOW DIAGRAM

CORPUS CHRISTI COGENERATION
CORPUS CHRISTI, TEXAS

DATE	PROJECT NO.	SCALE
OCT 2019	14847.004.001.0003	NOT TO SCALE

ATTACHMENT G

COOLING TOWER CHEMICALS

Attachment G
Summary of Cooling Tower and Boiler Chemicals

Corpus Christi Energy Center
Summary of Cooling Tower and Boiler Chemicals

Mfg.	Manufacturers Product Identification/ Number	Product Use	Chemical Composition	Corresponding CAS Number	Toxicity: Species and test	Toxicity: **LC50** and **NOEL** Lethal Concentration / No Observed Effect Level	Toxicity for whole Product?	Persistent Non-persistent bioaccumlative	Product or active ingred. half life: time	pH	Temp	Concentration of product in blowdown	Frequency of product use
Solenis (Ashland)	Amercor 8780	Corrosion Inhibitor	Cyclohexylamine (40-50%) Monoethanolamine (40-50%) Diethanolamine(.1-.5%)	108-91-8 141-43-5 111-42-2	Rainbow Trout Fathead Minnow Water flea	LC50 LC50 LC50	88.4 mg/L 70.7 mg/L 70.7 mg/L	Product Product Product	Non-persistent			0.01 ppm	Continuous
Solenis (Ashland)	Performax DC 5000	Corrosion inhibitor Cooling Tower Descaling	None listed		No data available							0.001 ppm	Continuous
Solenis (Ashland)	Biosperse 244DT	Microbiocide	2,2 Bibromo-3-Nitrilopropionamide (20-30%) Dibromoacetonitrile (>=0-<5%)	10222-01-2 3252-43-5	Sheephead minnow - 96h Bluegill - 96h fathead minnow - 96h Water flea - 48h	LC50 LC50 LC50 LC50	2.3 mg/L 2.3 mg/L 0.62 mg/L 0.86 mg/L	Product 10222-01-2 3252-43-5 Product				<0.0001 ppm	Monthly
Drewgard	315	Closed System Treatment	Sodium molybdate Tolyltriazole, sodium salt Sodium hydroxide	7631-95-0 64665-57-2 1310-73-2	Rainbow trout - 96h Water flea - 48h	LC50 LC50	707 mg/L 7070 mg/L	Product Product					**DOES NOT GO TO THE OUTFALL**
DPC Industries	Dixichlor	Cooling Tower Organic Growth Inhibit	Sodium hypochlorite (12.5%) Sodium chloride (9-10%) Sodium Hydroxide (0.5-2%) Water	7681-52-9 7647-14-5 1310-73-2 7732-18-5	Daphina magna - 24h Zebra fish - 24h	LC50 LC50	>500 mg/L >500 mg/L					0.001 ppm product 0.6 ppm chlorine	Continuous
Brenntag Southwest		Cooling Tower Organic Growth Inhibitor	Sodium hypochlorite (10-15%) Sodium hydroxide (0.3-1.8%) Sodium chloride (9-14.9%) Sodium carbonate (<0.5%) Water	7681-52-9 1310-73-2 7647-14-5 498-79-8 7732-18-5	Rainbow trout Bluegill Sunfish Daphnia Bobwhite quail - oral Mallard duck - acute dietary Bobwhite quail - dietary Fathead minnows - 96h	LC50 LC50 LC50 LD50 LC50 LC50 LC50	0.18-0.22 mg/L 0.44-0.79 mg/L 0.033-0.048 mg/L >2510 mg/kg >5220 ppm >5620 ppm 5.9 mg/LO					0.001 ppm product 0.6 ppm chlorine	Continuous

SAFETY DATA SHEET

Revision Date: 11/29/2012
Print Date: 2/8/2013
MSDS Number: R0310481
Version: 1.11

Amercor™ 8780 CORROSION INHIBITOR
™ Trademark, Ashland or its subsidiaries, registered in various countries84401

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Ashland P.O. Box 2219 Columbus, OH 43216	Regulatory Information Number Telephone Emergency telephone number	1-800-325-3751 614-790-3333 1-800-ASHLAND (1-800-274-5263)

Product name	Amercor™ 8780 CORROSION INHIBITOR ™ Trademark, Ashland or its subsidiaries, registered in various countries
Product code	84401
Product Use Description	Corrosion inhibitor.

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid, light yellow

DANGER! COMBUSTIBLE LIQUID AND VAPOR. HARMFUL IF ABSORBED THROUGH THE SKIN. HARMFUL IF SWALLOWED. HARMFUL IF INHALED. CAUSES SEVERE BURNS OF THE EYES AND SKIN.

Potential Health Effects

Exposure routes

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

Can cause permanent eye injury. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure the cornea and cause blindness.

Skin contact

Can cause permanent skin damage. Symptoms may include redness, burning, and swelling of skin, burns, and other skin damage. Passage of this material into the body through the skin is possible, and skin contact may be harmful.

Ingestion

Swallowing this material may be harmful or fatal. Symptoms may include severe stomach and intestinal irritation (nausea, vomiting, diarrhea), abdominal pain, and vomiting of blood. Swallowing this material may cause burns and destroy tissue in the mouth, throat, and digestive tract. Low blood pressure and shock may occur as a result of severe tissue injury. This material can get into the lungs during swallowing or vomiting. This results in lung inflammation and other lung injury.

Inhalation

Breathing of vapor or mist is possible. Breathing this material may be harmful or fatal. Symptoms may include severe irritation and burns to the nose, throat, and respiratory tract. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material:, Skin, lung (for example, asthma-like conditions), Liver, Kidney, male reproductive system, Exposure to this material may aggravate any preexisting condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemias.

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:, stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), cough, central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), nervousness, effects on blood pressure, chest pain, halo vision (blurred vision around bright objects), Shortness of breath, loss of coordination, methemoglobinemia (blood abnormality which causes a blue coloring to the skin), lung edema (fluid buildup in the lung tissue), kidney damage, liver damage

Target Organs

Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals:, mild, reversible bladder effects, anemia, heart damage, central nervous system damage, effects on male fertility, testis damage, kidney damage, liver damage

Carcinogenicity

Diethanolamine has been shown to cause cancer in laboratory animals. The relevance of this finding to humans is uncertain. Diethanolamine is listed as a possible human carcinogen by the International Agency for Research on Cancer (IARC).

Reproductive hazard

This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies. Harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain., Monoethanolamine caused harm to the fetus in a laboratory animal study in which high doses of the material were placed in the stomachs of the mothers through a feeding tube. However, in others studies monoethanolamine was not harmful to unborn rats or rabbits when the chemical was given to the mothers by skin contact. Contact with monoethanolamine in the workplace at levels which are not harmful to the mother should have no effect on the unborn baby.

Other information

This material (or a component) has been both positive and negative in tests for mutagenicity. The relevance of this finding to human health is uncertain. This product contains amines which may react with nitrites or other nitrosating agents to form nitrosamines. Certain nitrosamines have been shown to cause cancer in laboratory animals.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components	CAS-No. / Trade Secret No.	Concentration
CYCLOHEXYLAMINE	108-91-8	>=40-<50%
MONOETHANOLAMINE	141-43-5	>=40-<50%
DIETHANOLAMINE	111-42-2	>=0.1-<0.5%

4. FIRST AID MEASURES

Eyes

If material gets into the eyes, immediately flush eyes gently with water for at least 15 minutes while holding eyelids apart. If symptoms develop as a result of vapor exposure, immediately move individual away from exposure and into fresh air before flushing as recommended above. Seek immediate medical attention.

Skin

Immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention. Wash clothing before reuse and discard contaminated shoes.

Ingestion

Seek immediate medical attention. Do not induce vomiting. Vomiting will cause further damage to the mouth and throat. If individual is conscious and alert, immediately rinse mouth with water and give milk or water to drink. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Notes to physician

Hazards: Overexposure to this product (or a component) may cause methemoglobinemia, which in sufficient concentration causes cyanosis. Severe cyanosis may require intravenous injection of methylene blue. Methylene blue is contraindicated if the patient has confirmed or suspected glucose-6-phosphate dehydrogenase deficiency. Pulmonary edema may be delayed.

Treatment: No information available.

5. FIREFIGHTING MEASURES

Suitable extinguishing media

Dry chemical, Carbon dioxide (CO2), Water spray

Hazardous combustion products

Ammonia, carbon dioxide and carbon monoxide, Cyanides, nitrogen oxides (NOx), toxic fumes, various hydrocarbons

Precautions for fire-fighting

If product is heated above its flash point it will produce vapors sufficient to support combustion. Vapors are heavier than air and may travel along the ground and be ignited by heat, pilot lights, other flames and ignition sources at locations near the point of release. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning material with water used for cooling purposes.

NFPA Flammable and Combustible Liquids Classification

Combustible Liquid Class II

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

For personal protection see section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Ensure adequate ventilation. Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Pay attention to the spreading of gases especially at ground level (heavier than air) and to the direction of the wind.

Environmental precautions

Prevent spreading over a wide area (e.g. by containment or oil barriers). Do not let product enter drains. Do not flush into surface water or sanitary sewer system. Local authorities should be advised if significant spillages cannot be contained.

Methods for cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

Other information

Comply with all applicable federal, state, and local regulations. Suppress (knock down) gases/vapours/mists with a water spray jet.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Static ignition hazard can result from handling and use. Electrically bond and ground all containers, personnel and equipment before transfer or use of material. Special precautions may be necessary to dissipate static electricity for non-conductive containers. Use proper bonding and grounding during product transfer as described in National Fire Protection Association document NFPA 77.

Storage

Store in a cool, dry, ventilated area. Keep from freezing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

CYCLOHEXYLAMINE		**108-91-8**
ACGIH	time weighted average	10 ppm
NIOSH	Recommended exposure limit (REL):	10 ppm
NIOSH	Recommended exposure limit (REL):	40 mg/m3
MONOETHANOLAMINE		**141-43-5**
ACGIH	time weighted average	3 ppm
ACGIH	Short term exposure limit	6 ppm
NIOSH	Recommended exposure limit (REL):	3 ppm
NIOSH	Recommended exposure limit (REL):	8 mg/m3
NIOSH	Short term exposure limit	6 ppm
NIOSH	Short term exposure limit	15 mg/m3
OSHA Z1	Permissible exposure limit	3 ppm
OSHA Z1	Permissible exposure limit	6 mg/m3

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

Mechanical ventilation systems used to ventilate corrosive storage or process areas must be designed with components that are corrosion resistant.

Eye protection

Wear chemical splash goggles and face shield when there is potential for exposure of the eyes or face to liquid, vapor or mist. Maintain eye wash station in immediate work area.

Skin and body protection

Wear appropriate chemical impervious clothing and boots whenever there is potential for skin contact with product. Launder clothing before reuse. Maintain safety shower at all locations where skin contact could occur. Contact your local safety equipment supplier to assist the facility in determining proper selection of personal protective equipment for the applications/operations present at your facility. Wear resistant gloves (consult your safety equipment supplier).
Discard gloves that show tears, pinholes, or signs of wear.

Respiratory protection

A NIOSH-approved air-purifying respirator with an appropriate cartridge and/or filter may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits (if applicable) or if overexposure has otherwise been determined. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are not known or any other circumstances where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Colour	light yellow
Boiling point/boiling range	212 °F / 100 °C @ 1,013.00 hPa Calculated Phase Transition Liquid/Gas
Melting point/range	(ca.)32 °F / 0 °C
pH	13
Flash point	111.99 °F / 44.44 °C Pensky Martens closed cup
Evaporation rate	(>)1 Ethyl Ether
Lower explosion limit/Upper explosion limit	1.5 %(V) / 17 %(V)
Vapour pressure	23.330 hPa @ 68 °F / 20 °C Calculated Vapor Pressure
Relative vapor density	(>)1 AIR=1
Density	0.968 g/cm3
Water solubility	soluble

10. STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid

Heat, flames and sparks. Heat, flames and sparks., Exposure to moisture.

Incompatible products

acids, Aldehydes, aluminum, Copper, Copper alloys, galvanized metals, halogenated hydrocarbons, Iron, Ketones, organic anhydrides, organic halides, organic solvent, Reducing agents, Strong acids, strong alkalis, Strong oxidizing agents, Zinc

Hazardous decomposition products

Amines, carbon dioxide and carbon monoxide, Cyanides, nitrogen oxides (NOx), Ammonia

Hazardous reactions

Product will not undergo hazardous polymerization.

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity

Acute oral toxicity - Product	:	no data available

Acute oral toxicity - Components

CYCLOHEXYLAMINE	:	LD 50: 156 mg/kg Species: Rat
MONOETHANOLAMINE	:	LD 50: 1,720 mg/kg Species: Rat
DIETHANOLAMINE	:	LD 50: 680 mg/kg Species: Rat

Acute inhalation toxicity

Acute inhalation toxicity - Product	:	no data available

Acute inhalation toxicity - Components

CYCLOHEXYLAMINE	:	LC 50: 2.3 mg/l Exposure time: 4 h Species: Rat

Acute dermal toxicity

Acute dermal toxicity - Product	:	no data available

Acute dermal toxicity - Components

CYCLOHEXYLAMINE	:	LD 50: 277 mg/kg Species: Rabbit
MONOETHANOLAMINE	:	LD 50: 1,000 mg/kg Species: Rabbit
DIETHANOLAMINE	:	LD 50: > 8,200 mg/kg Species: Rabbit

Acute toxicity (other routes of administration)

Acute toxicity (other routes of administration)	:	no data available

12. ECOLOGICAL INFORMATION

Biodegradability

Biodegradability - Product	:	no data available

Biodegradability - Components

MONOETHANOLAMINE	:	> 70 % Method: OECD Test Guideline 301F Remarks: Readily biodegradable

Bioaccumulation

Bioaccumulation - Product	:	no data available

Ecotoxicity effects

Toxicity to fish

Toxicity to fish - Product	:	LC 50: 88.4 mg/l Exposure time: 96 h Species: Oncorhynchus mykiss (rainbow trout) Test Type: static testLC 50: 70.7 mg/l Exposure time: 96 h Species: Pimephales promelas (fathead minnow)

	Test Type: static test

Toxicity to fish - Components

CYCLOHEXYLAMINE	:	LC 50: 470 mg/l Exposure time: 96 h Species: Danio rerio (zebra fish) Method: Static Remarks: Mortality

MONOETHANOLAMIN E	:	LC 50: 114 - 196 mg/l Exposure time: 96 h Species: Rainbow trout,donaldson trout (Oncorhynchus mykiss) Test Type: static test
		LC 50: 349 mg/l Exposure time: 96 h Species: Cyprinus carpio (Carp) Test Type: semi-static test

DIETHANOLAMINE	:	LC 50: > 100 mg/l Exposure time: 96 h Species: Fathead minnow (Pimephales promelas) Method: Static Remarks: Mortality

Toxicity to daphnia and other aquatic invertebrates

Toxicity to daphnia and other aquatic invertebrates - Product	:	LC 50: 70.7 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) Test Type: static test

Toxicity to daphnia and other aquatic invertebrates - Components

CYCLOHEXYLAMINE	:	LC 50: 80 mg/l Exposure time: 24 h Species: Water flea (Daphnia magna) Method: Static Remarks: Mortality

MONOETHANOLAMINE	:	EC 50: 65 mg/l Exposure time: 48 h Species: Water flea (Daphnia magna) Test Type: static test

DIETHANOLAMINE	:	LC 50: 96.3 - 124.6 mg/l Exposure time: 48 h Species: Water flea (Daphnia magna) Method: Static Remarks: Mortality
		LC 50: 55 mg/l Exposure time: 48 h Species: Water flea (Daphnia magna) Test Type: static test

Toxicity to algae

Toxicity to algae - Product	:	no data available

Toxicity to algae - Components

MONOETHANOLAMINE	:	EC 50: 2.5 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201 Test Type: Growth inhibition

DIETHANOLAMINE	:	EC 50: 2.2 mg/l Exposure time: 96 h Species: Pseudokirchneriella subcapitata (green algae)

Toxicity to bacteria

Toxicity to bacteria - Product	:	no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

Dispose of in accordance with all applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.
U.S. DOT - ROAD					
UN 2733	Amines, flammable, corrosive, n.o.s. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III	
U.S. DOT - RAIL					
UN 2733	Amines, flammable, corrosive, n.o.s. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III	
U.S. DOT - INLAND WATERWAYS					
UN 2733	Amines, flammable, corrosive, n.o.s. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III	
TRANSPORT CANADA - ROAD					
UN 2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III	
TRANSPORT CANADA - RAIL					
UN 2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III	

TRANSPORT CANADA - INLAND WATERWAYS

UN	2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III

INTERNATIONAL MARITIME DANGEROUS GOODS

UN	2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN	2733	Amines, flammable, corrosive, n.o.s. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

UN	2733	Amines, flammable, corrosive, n.o.s. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN	2733	AMINAS INFLAMABLES, CORROSIVAS, N.E.P. (CYCLOHEXYLAMINE, MONOETHANOLAMINE)	3	(8)	III

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65

Proposition 65 warnings are not required for this product based on the results of a risk assessment.	

SARA Hazard Classification
SARA 311/312 Classification
Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 Component(s)

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Notification status

US. Toxic Substances Control Act	y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	y (positive listing)
Australia. Industrial Chemical (Notification and Assessment) Act	y (positive listing)
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	y (positive listing)
Japan. Kashin-Hou Law List	y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List	y (positive listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	y (positive listing)
China. Inventory of Existing Chemical Substances	y (positive listing)

Reportable quantity - Product

US. EPA CERCLA Hazardous Substances (40 CFR 302)	61728 lbs

Reportable quantity-Components

DIETHANOLAMINE	111-42-2	100 lbs

	HMIS	NFPA
Health	3*	3
Flammability	2	2
Physical hazards	0	

Instability		0
Specific Hazard	--	--

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

SAFETY DATA SHEET

Revision Date: 01/14/2013
Print Date: 2/11/2013
MSDS Number: 000000006277
Version: 2.0

Biosperse™ 244 MICROBIOCIDE
™ Trademark, Ashland or its subsidiaries, registered in various countries67883

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Ashland P.O. Box 2219 Columbus, OH 43216	Regulatory Information Number Telephone Emergency telephone number	1-800-325-3751 614-790-3333 1-800-ASHLAND (1-800-274-5263)

Product name	Biosperse™ 244 MICROBIOCIDE ™ Trademark, Ashland or its subsidiaries, registered in various countries
Product code	67883

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid, yellow

DANGER! POISON! CAUSES SEVERE EYE BURNS. MAY BE HARMFUL IF ABSORBED THROUGH THE SKIN. CAUSES SKIN AND RESPIRATORY TRACT IRRITATION. HARMFUL IF SWALLOWED. MAY BE FATAL IF INHALED.

Potential Health Effects

Exposure routes

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

Can cause permanent eye injury. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure the cornea and cause blindness.

Skin contact

Can cause severe skin irritation. Symptoms may include redness and burning of skin, and other skin damage. Passage of this material into the body through the skin is possible, and may add to toxic effects from breathing or swallowing. Skin absorption of this material (or a component) may be increased through injured skin.

Ingestion

Swallowing this material may be harmful.

Inhalation

Breathing this material may be harmful or fatal. Symptoms may include severe irritation and burns to the nose, throat, and respiratory tract. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.). Excessive inhalation or ingestion may produce rashes, depression, emaciation, and in severe cases, psychoses and mental deterioration.

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material:, Skin, lung (for example, asthma-like conditions)

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:, stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), Headache

Target Organs

No data

Carcinogenicity

Dibromoacetonitrile is listed as a possible human carcinogen by the International Agency for Research on Cancer.

Reproductive hazard

This material (or a component) may be harmful to the human fetus based on positive test results with laboratory animals.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components	CAS-No. / Trade Secret No.	Concentration
2,2 DIBROMO-3-NITRILOPROPIONAMIDE	10222-01-2	>=20-<30%
DIBROMOACETONITRILE	3252-43-5	>=0-<5%

4. FIRST AID MEASURES

Eyes

If material gets into the eyes, immediately flush eyes gently with water for at least 15 minutes while holding eyelids apart. If symptoms develop as a result of vapor exposure, immediately move individual away from exposure and into fresh air before flushing as recommended above. Seek immediate medical attention.

Skin

Remove contaminated clothing. Flush exposed area with large amounts of water. If skin is damaged, seek immediate medical attention. If skin is not damaged and symptoms persist, seek medical attention. Launder clothing before reuse.

Ingestion

Seek immediate medical attention. Do not induce vomiting. Vomiting will cause further damage to the mouth and throat. If individual is conscious and alert, immediately rinse mouth with water and give milk or water to drink. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Notes to physician

Hazards: No information available.

Treatment: Probable mucosal damage may contraindicate the use of gastric lavage.

5. FIREFIGHTING MEASURES

Suitable extinguishing media

Dry chemical, Carbon dioxide (CO2), Water spray

Hazardous combustion products

Alcohols, Bromine, carbon dioxide and carbon monoxide, Cyanides, ethers, Hydrocarbons, hydrogen bromide, Ketones, nitrogen oxides (NOx), Sodium oxides

Precautions for fire-fighting

Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). DO NOT direct a solid stream of water or foam into hot, burning pools of liquid since this may cause frothing and increase fire intensity. Frothing can be violent and possibly endanger any firefighter standing too close to the burning liquid. Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning material with water used for cooling purposes.

NFPA Flammable and Combustible Liquids Classification

Combustible Liquid Class IIIB

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

For personal protection see section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

Environmental precautions

Prevent spreading over a wide area (e.g. by containment or oil barriers). Do not let product enter drains. Do not flush into surface water or sanitary sewer system.

Methods for cleaning up

Keep in suitable, closed containers for disposal. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).

Other information

Comply with all applicable federal, state, and local regulations.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage

Store in a cool, dry, ventilated area. Keep from freezing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Contains no substances with occupational exposure limit values.

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

Mechanical ventilation systems used to ventilate corrosive storage or process areas must be designed with components that are corrosion resistant.

Eye protection

Wear chemical splash goggles and face shield when there is potential for exposure of the eyes or face to liquid, vapor or mist. Maintain eye wash station in immediate work area.

Skin and body protection

Wear appropriate chemical impervious clothing and boots whenever there is potential for skin contact with product. Launder clothing before reuse. Maintain safety shower at all locations where skin contact could occur. Contact your local safety equipment supplier to assist the facility in determining proper selection of personal protective equipment for the applications/operations present at your facility.
Wear resistant gloves (consult your safety equipment supplier).
Discard gloves that show tears, pinholes, or signs of wear.

Respiratory protection

A NIOSH-approved air-purifying respirator with an appropriate cartridge and/or filter may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits (if applicable) or if overexposure has otherwise been determined. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are not known or any other circumstances where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Colour	yellow
Boiling point/boiling range	(>)158 °F / 70 °C
pH	3.4
Flash point	> 212 °F / > 100 °C Closed Cup
Evaporation rate	(<)1 Ethyl Ether
Relative vapor density	(<)1 AIR=1
Density	1.25 g/cm3 @ 73.40 °F / 23.00 °C
	10.4 lb/gal @ 77 °F / 25 °C
Water solubility	soluble

10. STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid

temperatures above 150 degrees F (66 °C), Heat, flames and sparks., Exposure to moisture.

Incompatible products

Acids, aluminum, anionic materials, Bases, oxidizable substances, reducing agents, Strong oxidizing agents

Hazardous decomposition products

Alcohols, Bromine, carbon dioxide and carbon monoxide, Cyanides, ethers, Hydrocarbons, hydrogen bromide, nitrogen oxides (NOx), ketones

Hazardous reactions

Product will not undergo hazardous polymerization.

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity

Acute oral toxicity - Product	:	no data available

Acute oral toxicity - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	LD 50: 235 mg/kg Species: Rat, male
		LD 50: 178 mg/kg Species: Rat, female
DIBROMOACETONITRILE	:	LD 50: 245 mg/kg Species: Rat

Acute inhalation toxicity

Acute inhalation toxicity - Product	:	no data available

Acute inhalation toxicity - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	LC 50: 0.32 mg/l Exposure time: 4 h Species: Rat

Acute dermal toxicity

Acute dermal toxicity - Product	:	no data available

Acute dermal toxicity - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	LD 50: > 2 g/kg Species: Rabbit

Acute toxicity (other routes of administration)

Acute toxicity (other routes of administration)	:	no data available

12. ECOLOGICAL INFORMATION

Biodegradability

Biodegradability - Product	:	no data available

Biodegradability - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	35 - 78 % Method: OECD Test Guideline 301B Remarks: Not readily biodegradable.

Bioaccumulation

Bioaccumulation - Product	:	no data available

Ecotoxicity effects

Toxicity to fish

Toxicity to fish - Product	:	LC 50: 2.3 mg/l Exposure time: 96 h Species: Oncorhynchus mykiss (rainbow trout)LC 50: 3.4 mg/l Exposure time: 96 h Species: Cyprinodon variegatus (sheepshead minnow)

Toxicity to fish - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	LC 50: 1.0 mg/l Exposure time: 96 h Species: Oncorhynchus mykiss (rainbow trout)
		LC 50: 2.3 mg/l Exposure time: 96 h Species: Bluegill (Lepomis macrochirus)

DIBROMOACETONITRILE	:	LC 50: 0.49 - 0.62 mg/l Exposure time: 96 h Species: Fathead minnow (Pimephales promelas) Method: Static Remarks: Mortality

Toxicity to daphnia and other aquatic invertebrates

Toxicity to daphnia and other aquatic invertebrates - Product	:	EC 50: 0.86 mg/l Exposure time: 48 h Species: Water flea (Daphnia magna)

Toxicity to daphnia and other aquatic invertebrates - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	EC 50: 0.86 mg/l Exposure time: 48 h Species: Water flea (Daphnia magna)

Toxicity to algae

Toxicity to algae - Product	:	no data available

Toxicity to algae - Components

2,2 DIBROMO-3-NITRILOPROPIONAMIDE	:	EC 50: 0.30 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae)

Toxicity to bacteria

Toxicity to bacteria - Product	:	no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

Dispose of in accordance with all applicable local, state and federal regulations. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance. Do not contaminate water, food, or feed, by storage or disposal or cleaning of equipment. Do not put product, spilled product, or filled or partially filled containers into the trash or waste compactor. Contact with incompatible materials could cause a reaction or fire. Do not reuse container. Rinse thoroughly before discarding in trash.

14. TRANSPORT INFORMATION

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.

U.S. DOT - ROAD

UN	3082	Environmentally hazardous substances, liquid, n.o.s. (2,2-DIBROMO-2-CYANOACETAMIDE)	9		III

U.S. DOT - RAIL

UN	3082	Environmentally hazardous substances, liquid, n.o.s. (2,2-DIBROMO-2-CYANOACETAMIDE)	9		III

U.S. DOT - INLAND WATERWAYS

UN	3082	Environmentally hazardous substances, liquid, n.o.s. (2,2-DIBROMO-2-CYANOACETAMIDE)	9		III

TRANSPORT CANADA - ROAD

UN	3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-DIBROMO-2-CYANOACETAMIDE)	9		III

TRANSPORT CANADA - RAIL

UN	3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-DIBROMO-2-CYANOACETAMIDE)	9		III

TRANSPORT CANADA - INLAND WATERWAYS

UN	3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-DIBROMO-2-CYANOACETAMIDE)	9	III

INTERNATIONAL MARITIME DANGEROUS GOODS

UN	3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,2-DIBROMO-2-CYANOACETAMIDE)	9	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN	3082	Environmentally hazardous substance, liquid, n.o.s. (2,2-DIBROMO-2-CYANOACETAMIDE)	9	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

UN	3082	Environmentally hazardous substance, liquid, n.o.s. (2,2-DIBROMO-2-CYANOACETAMIDE)	9	III

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN	3082	SUSTANCIA LIQUIDA POTENCIALMENTE PELIGROSAS PARA EL MEDIO AMBIENTE, N.E.P. (2,2-DIBROMO-2-CYANOACETAMIDE)	9	III

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65

WARNING! This product contains a chemical known to the State of California to cause cancer.	DIBROMOACETONITRILE

SARA Hazard Classification
SARA 311/312 Classification
Acute Health Hazard
Chronic Health Hazard

SARA 313 Component(s)
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Notification status

US. Toxic Substances Control Act	y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	q (quantity restricted)
Australia. Industrial Chemical (Notification and Assessment) Act	n (Negative listing)
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	y (positive listing)
Japan. Kashin-Hou Law List	n (Negative listing)
Korea. Toxic Chemical Control Law (TCCL) List	n (Negative listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	y (positive listing)
China. Inventory of Existing Chemical Substances	y (positive listing)

	HMIS	NFPA
Health	3	3
Flammability	1	1
Physical hazards	1	
Instability		1
Specific Hazard	--	--

SAFETY DATA SHEET

Biosperse™ 244 MICROBIOCIDE
™ Trademark, Ashland or its subsidiaries, registered in various countries67883

Biocides
74655-21

Hercules Incorporated, A wholly owned subsidiary of Ashland Inc.

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product identifier: **DIXICHLOR MAX**
Synonyms: Bleach, Sodium Hypochlorite, Sodium Hypochlorite 12.5%
Intended use: Swimming pool chlorinator, Hard surface cleaner, Water treatment chemical, Biocides
Uses Advised Against: None identified. This is a pesticide product, do not use in a pesticide application that is not included on the label.

Company Identification
DPC Industries, Inc.
DPC Enterprises, LP
DXI Industries, Inc.
DX Terminals
PO Box 24600
Houston , TX 77229-4600

Emergency
CHEMTREC (USA) (800) 424-9300
24 hour Emergency Telephone No. (281) 457-4888
www.dxgroup.com

2. Hazard identification of the product

Physical hazards	Corrosive to metals	Category 1
Health hazards	Skin corrosion/irritation Serious eye damage/eye irritation Specific target organ toxicity, single exposure	Category 1 Category 1 Category 3 respiratory tract irritation
Environmental hazards	Hazardous to the aquatic environment, acute hazard Hazardous to the aquatic environment, long-term hazard	Category 1 Category 2

Label elements
Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.

Signal Word	**Danger**
Hazard Statements	Harmful in contact with skin. Causes severe skin burns and eye damage. Causes serious eye damage. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects. May be corrosive to metals
Precautionary Statements	
Prevention	Do not breathe mist / vapors / spray. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves / eye protection / face protection. Use in well ventilated area.
Response	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN: Remove / Take off immediately all contaminated clothing. Wash with plenty of soap and water. IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor / physician if you feel unwell. IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing. Immediately call a POISON CENTER or doctor / physician. Wash contaminated clothing before reuse. Collect spillage.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight.
Disposal	Dispose of contents / container in accordance with local / national regulations.

Safety Data Sheet

3. Composition/information on ingredients

Synonyms: Bleach, Sodium Hypochlorite, Sodium Hypochlorite 12.5%

Ingredient	CAS Number	Percent (%)	NOTES
Sodium hypochlorite.	7681-52-9	12.5 - 15.6	Substance classified with a health or environmental hazard.
Sodium chloride	7647-14-5	9 - 10	Substance classified with a health or environmental hazard.
Sodium hydroxide	1310-73-2	0.5 - 2	Substance classified with a health or environmental hazard. Substance with a workplace exposure limit.

4. First Aid Measures

General	Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
Inhalation	Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.
Eyes	Irrigate copiously with clean fresh water for at least 10 minutes, holding the eyelids apart. Get medical attention. Remove contact lenses if present and easy to do - continue rinsing.
Skin	Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser. Do NOT use solvents or thinners.
Ingestion	If accidentally swallowed obtain immediate medical attention. Rinse mouth. Keep at rest. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content does not get into lungs.
Most important symptoms and effects, both acute and delayed	
Overview	Corrosive effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Recommended Extinguishing media	Alcohol resistant foam, CO^2, dry chemical powder, water spray. Do not use water jet.
Special hazards arising from the substance or mixture	Hydrogen chloride and chlorine. Chlorine gas rate of decomposition increases with the concentration with temperatures above 85 °F (30 °C). Do not breathe mist / vapors / spray.
Advice for fire-fighters	Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. **ERG Guide No.** 154

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Local authorities should be contacted if significant spill cannot be contained.
Environmental precautions	Do not allow spills to enter drains or watercourses.
Methods and material for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills in original containers for re-use. For waste disposal, see Section 13 of the SDS.

7. Handling and storage

Precautions for safe handling	Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Chemical attack increases with solution strength. Use with adequate ventilation. Observe good industrial hygiene practices. Do not apply heat or direct sunlight. Temperature and product concentration affect product quality and decomposition rates.
Conditions for safe storage, including any incompatibilities	Handle containers carefully to prevent damage and spillage. Keep container tightly closed. Store in a cool and well-ventilated place. Store in a corrosive resistant container. Consult container manufacturer for additional guidance. Store away from and do not mix with incompatible materials such as acids, ammonia, urea, oxidizers, organics and metals such as nickel, copper, tin, aluminum and iron.

8. Exposure controls and personal protection

Exposure Control Parameters

CAS No.	Ingestion	Source	Value
1310-73-2	Sodium hydroxide	OSHA	TWA 2 mg/m3
		ACGIH	Ceiling: 2 mg/m3
		NIOSH	C 2 mg/m3
7647-14-5	Sodium chloride	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
7681-52-9	Sodium hypochlorite.	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit

Individual protection measures, such as personal protective equipment

Respiratory	Use NIOSH/MSHA approved respirator, following manufacturer's recommendations when concentrations exceed permissible exposure limits.
Eyes	Wear face shield with safety glasses with side shields and/or safety goggles.
Skin	Chemical resistant clothing such as coveralls/apron boots should be worn. Chemical Impervious gloves.
Engineering Controls	Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn. Eye wash and safety shower must be available when handling this product
Other Work Practices	Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

9. Physical and chemical properties

Appearance	Clear, pale yellow, or greenish Liquid
Odor	Pungent, chlorine odor
Odor threshold	0.9 mg/m^3
pH	12 - 13
Melting point / freezing point	-3 °F (-19.4 °C)
Initial boiling point and boiling range	Decomposes above 230 °F (110 °C)
Flash Point	Nonflammable
Evaporation rate (Ether = 1)	Not Established
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (mmHg)	17.5 (@ 20° C)
Vapor Density	Not Established
Specific Gravity	1.20 - 1.40
Solubility in Water	Complete
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature (°C)	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	Not Measured
VOC %	Not Measured
Other information	No other relevant information.

10. Stability and reactivity

Reactivity	Hazardous Polymerization will not occur.
Chemical stability	Stable under normal circumstances.
Possibility of hazardous reactions	No data available.
Conditions to avoid	Contact with incompatible materials. Acid contact will produce chlorine gas.
Incompatible materials	Any acidic material, ammonia, urea, oxidizers, organics and metals such as nickel, copper, tin, aluminum and iron.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LC50, mg/L/4hr	Inhalation Dust/Mist LC50, mg/L/4hr	Inhalation Gas LC50, ppm
Sodium hypochlorite (7681-52-9)	5,000.00, Rat - Category: 5	10,000.00, Rabbit - Category: NA	10.50, Rat - Category: 4	No data available	No data available
Sodium chloride (7647-14-5)	1,350.00, Rabbit - Category: 4	100.00, Rat - Category: 2	40.00, Mouse - Category: NA	10,500.00, Rat - Category: NA	No data available
Sodium hydroxide (1310-73-2)	6,600.00, Mouse - Category: NA	1,350.00, Rabbit - Category: 4	600.00, Mouse - Category: NA	No data available	No data available

11. Toxicological information

Acute toxicity (cont.)

Item	Hazard
Acute Toxicity (mouth)	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.
Acute Toxicity (skin)	Harmful in contact with skin.
Acute Toxicity (inhalation)	Vapors and spray mist may irritate throat and respiratory system and cause coughing.
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Eye damage/irritation	Causes serious eye damage.
Sensitization (respiratory)	No data available.
Sensitization (skin)	No data available.
Germ toxicity	No data available.
Carcinogenicity	Not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive Toxicity	No data available.
Specific target organ systemic toxicity (single exposure)	May cause respiratory irritation.
Specific target organ systemic Toxicity (repeated exposure)	Not Applicable.
Aspiration hazard	Not classified; however droplets of product may be aspirated into lungs, through ingestion or vomiting and may cause serious chemical pneumonia.

12. Ecological information

Toxicity: Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Sodium hypochlorite (7681-52-9)	0.08, Pimephales promelas	0.032, Daphnia magna	0.40 (72 hr), Dunaliella primolecta
Sodium chloride (7647-14-5)	1,100.00, Freshwater Fish	3,310.00, Daphnia magna	Not Available
Sodium hydroxide (1310-73-2)	196.00, Poecilia reticulata	40.38, Ceriodaphnia dubia	Not Available

Persistence and degradability:	There is no data available on the preparation itself.
Bioaccumulative potential:	Not Measured
Mobility in soil:	No data available.
Results of PBT and vPvB assessment:	This product contains no PBT/vPvB chemicals.
Other adverse effects:	No other effects are expected.

13. Disposal considerations

Waste treatment methods:	Do not allow into drains or water courses. Wastes and emptied containers should be disposed of in accordance with regulations made under the Control of Pollution Act and the Environmental Protection Act. Using information provided in this data sheet, advice should be obtained from the Waste Regulation Authority, whether the special waste regulations apply.
Waste from material:	The waste determination should be made in discussion between the user and the waste disposal company**.**
Container Management:	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

Safety Data Sheet

14. Transport information

UN number:	UN1791
UN proper shipping name:	Hypochlorite solutions
Transport hazard class(es)	
DOT (Domestic Surface Transportation)	
DOT Proper Shipping Name:	Hypochlorite solutions
DOT Hazard Class: **DOT Label:**	8 8
UN / NA Number:	UN1791
DOT Packing Group:	III
CERCLA/DOT RQ:	100 lbs.
Environmental hazards:	IMDG Marine Pollutant: Yes (Sodium hypochlorite)
Special precautions for user:	Not Applicable

15. Regulatory information

Regulatory Overview:	The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented. All ingredients of this product are listed on the TSCA (Toxic Substance Control Act) Inventory.	
WHMIS Classification	D2B E	
US EPA Tier II Hazards:	**Fire:**	No
	Sudden Release of Pressure:	No
	Reactive:	No
	Immediate (Acute):	Yes
	Delayed (Chronic):	No
SARA 302 Extremely Hazardous Substance:		No
SARA 311/312 Chemicals and RQs (lbs) (>0.1%) :		100
SARA 313 (TRI):		No
CAA Section 112 Hazardous Air Pollutant:		No
CAA Section 112R Risk Management Plan:		No
State Regulations	**N.J. RTK Substances (>1%) :**	Listed
	Penn RTK Substances (>1%) :	Listed
	California Prop 65:	Not Listed

16. Other information:

EPA Registration Number: 813-15
NSF Maximum Use Level (STD 60): Check BOL for facility Data. (37 to 84 mg/L)

Revision Information: This is the first revision of this SDS format, changes from previous revision not applicable.

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

THE USER IS CAUTIONED TO PERFORM HIS OWN HAZARD EVALUATION AND TO RELY ON HIS OWN DETERMINATIONS.

DREWGARD 315

Solenis New Zealand Ltd

Chemwatch Hazard Alert Code: **3**

Chemwatch: **79-9742**
Version No: **2.1.1.1**
Safety Data Sheet according to HSNO Regulations

Issue Date: **27/04/2017**
Print Date: **04/07/2017**
L.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	DREWGARD 315
Proper shipping name	CAUSTIC ALKALI LIQUID, N.O.S. (contains sodium hydroxide)
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Use according to manufacturer's directions. Closed system corrosion inhibitor.

Details of the supplier of the safety data sheet

Registered company name	Solenis New Zealand Ltd
Address	119 Carbine Rd, PO Box 132-347 Auckland 1644 New Zealand
Telephone	64 9 276 6620
Fax	64 9 276 6690
Website	Solenis.com
Email	nzorders@solenis.com

Emergency telephone number

Association / Organisation	Chemwatch
Emergency telephone numbers	0080024362255
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation.
Classified as Dangerous Goods for transport purposes.

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability	0		
Toxicity	1		
Body Contact	3		
Reactivity	0		
Chronic	0		

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

Classification [1]	Metal Corrosion Category 1, Acute Toxicity (Oral) Category 5, Skin Corrosion/Irritation Category 1C, Serious Eye Damage Category 1

Continued...

Legend:	*1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI*
Determined by Chemwatch using GHS/HSNO criteria	6.1E (oral), 8.1A, 8.2C, 8.3A

Label elements

Hazard pictogram(s)	

SIGNAL WORD	DANGER

Hazard statement(s)

H290	May be corrosive to metals.
H303	May be harmful if swallowed.
H314	Causes severe skin burns and eye damage.

Precautionary statement(s) Prevention

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P234	Keep only in original container.

Precautionary statement(s) Response

P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Precautionary statement(s) Storage

P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
7631-95-0	10-20	sodium molybdate
64665-57-2	1-5	sodium tolyltriazole
1310-73-2	0.5-2	sodium hydroxide
Not Available	>60	Ingredients determined not to be hazardous

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Continued...

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▸ Immediately hold eyelids apart and flush the eye continuously with running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▸ Transport to hospital or doctor without delay. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▸ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▸ Quickly remove all contaminated clothing, including footwear. ▸ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▸ Transport to hospital, or doctor.
Inhalation	▸ If fumes or combustion products are inhaled remove from contaminated area. ▸ Lay patient down. Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ Transport to hospital, or doctor.
Ingestion	▸ For advice, contact a Poisons Information Centre or a doctor at once. ▸ Urgent hospital treatment is likely to be needed. ▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Transport to hospital or doctor without delay.

Indication of any immediate medical attention and special treatment needed

for corrosives:

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.
- Where eyes have been exposed, flush immediately with water and continue to irrigate with normal saline during transport to hospital.
- **DO NOT** use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- Skin burns should be covered with dry, sterile bandages, following decontamination.
- **DO NOT** attempt neutralisation as exothermic reaction may occur.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

EMERGENCY DEPARTMENT

- Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime.
- Positive end-expiratory pressure (PEEP)-assisted ventilation may be required for acute parenchymal injury or adult respiratory distress syndrome.
- Consider endoscopy to evaluate oral injury.
- Consult a toxicologist as necessary.

BRONSTEIN, A.C. and CURRANCE, P.L. EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

Continued...

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear full body protective clothing with breathing apparatus. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Use fire fighting procedures suitable for surrounding area. ▸ **Do not** approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	▸ Non combustible. ▸ Not considered a significant fire risk, however containers may burn. May emit corrosive fumes.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▸ Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material. ▸ Check regularly for spills and leaks. ▸ Clean up all spills immediately. ▸ Avoid breathing vapours and contact with skin and eyes. ▸ Control personal contact with the substance, by using protective equipment. ▸ Contain and absorb spill with sand, earth, inert material or vermiculite. ▸ Wipe up. ▸ Place in a suitable, labelled container for waste disposal.
Major Spills	▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear full body protective clothing with breathing apparatus. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Stop leak if safe to do so. ▸ Contain spill with sand, earth or vermiculite. ▸ Collect recoverable product into labelled containers for recycling. ▸ Neutralise/decontaminate residue (see Section 13 for specific agent). ▸ Collect solid residues and seal in labelled drums for disposal. ▸ Wash area and prevent runoff into drains. ▸ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using. ▸ If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▸ **DO NOT** allow clothing wet with material to stay in contact with skin ▸ Avoid all personal contact, including inhalation.

Continued...

	▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ Avoid contact with moisture. ▸ Avoid contact with incompatible materials. ▸ When handling, **DO NOT** eat, drink or smoke. ▸ Keep containers securely sealed when not in use. ▸ Avoid physical damage to containers. ▸ Always wash hands with soap and water after handling. ▸ Work clothes should be laundered separately. Launder contaminated clothing before re-use. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Other information	▸ Store in original containers. ▸ Keep containers securely sealed. ▸ Store in a cool, dry, well-ventilated area. ▸ Store away from incompatible materials and foodstuff containers. ▸ Protect containers against physical damage and check regularly for leaks. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Lined metal can, lined metal pail/ can. ▸ Plastic pail. ▸ Polyliner drum. ▸ Packing as recommended by manufacturer. ▸ Check all containers are clearly labelled and free from leaks. For low viscosity materials ▸ Drums and jerricans must be of the non-removable head type. ▸ Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.): ▸ Removable head packaging; ▸ Cans with friction closures and ▸ low pressure tubes and cartridges may be used. - Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.
Storage incompatibility	▸ WARNING: Avoid or control reaction with peroxides. All *transition metal* peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively. ▸ The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono-or poly-fluorobenzene show extreme sensitivity to heat and are explosive. ▸ Avoid reaction with borohydrides or cyanoborohydrides ▸ Avoid strong acids, acid chlorides, acid anhydrides and chloroformates.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
New Zealand Workplace Exposure Standards (WES)	sodium hydroxide	Sodium hydroxide	Not Available	Not Available	2 mg/m3	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
sodium molybdate	Sodium molybdate dihydrate; (Disodium molybdate dihydrate)	3.8 mg/m3	34 mg/m3	210 mg/m3
sodium molybdate	Molybdic acid, disodium salt; (Disodium molybdate)	3.2 mg/m3	17 mg/m3	100 mg/m3
sodium tolyltriazole	Sodium tolyltriazole; (1H-Benzotriazole, 4(or 5)-methyl-, sodium salt)	1.9 mg/m3	21 mg/m3	130 mg/m3
sodium hydroxide	Sodium hydroxide	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
sodium molybdate	N.E. mg/m3 / N.E. ppm	1,000 mg/m3

Continued...

sodium tolyltriazole	Not Available	Not Available
sodium hydroxide	250 mg/m3	10 mg/m3
Ingredients determined not to be hazardous	Not Available	Not Available

MATERIAL DATA

Exposure controls

Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear approved respirator. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Personal protection

Eye and face protection

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

Skin protection

See Hand protection below

Continued...

Hands/feet protection	▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber ▸ When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: · frequency and duration of contact, · chemical resistance of glove material, · glove thickness and · dexterity Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent). · When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. · Contaminated gloves should be replaced. For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Body protection	See Other protection below
Other protection	▸ Overalls. ▸ PVC Apron. ▸ PVC protective suit may be required if exposure severe. ▸ Eyewash unit. ▸ Ensure there is ready access to a safety shower.
Thermal hazards	Not Available

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
DREWGARD 315

Material	CPI
BUTYL	C
NAT+NEOPR+NITRILE	C
NATURAL RUBBER	C
NATURAL+NEOPRENE	C
NEOPRENE	C
NEOPRENE/NATURAL	C
NITRILE	C
NITRILE+PVC	C
PE	C
PE/EVAL/PE	C

Continued...

PVC	C
SARANEX-23	C
SARANEX-23 2-PLY	C
TEFLON	C
VITON/CHLOROBUTYL	C

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Light brown alkaline liquid; miscible with water.

Physical state	Liquid	**Relative density (Water = 1)**	1.133-1.155
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available
pH (as supplied)	>12.5	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	-4	**Viscosity (cSt)**	Not Available
Initial boiling point and boiling range (°C)	100	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	Not Available	**Taste**	Not Available
Evaporation rate	1 > Ether = 1	**Explosive properties**	Not Available
Flammability	Not Available	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Available	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	Not Available	**Volatile Component (%vol)**	Not Available
Vapour pressure (kPa)	2.3	**Gas group**	Not Available
Solubility in water (g/L)	Miscible	**pH as a solution (1%)**	Not Available
Vapour density (Air = 1)	>1	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▸ Unstable in the presence of incompatible materials. ▸ Product is considered stable. ▸ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Continued...

Information on toxicological effects

Inhaled	Inhalation of alkaline corrosives may produce irritation of the respiratory tract with coughing, choking, pain and mucous membrane damage. Pulmonary oedema may develop in more severe cases; this may be immediate or in most cases following a latent period of 5-72 hours. Symptoms may include a tightness in the chest, dyspnoea, frothy sputum, cyanosis and dizziness. Findings may include hypotension, a weak and rapid pulse and moist rales.
Ingestion	The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion. Accidental ingestion of the material may be damaging to the health of the individual.
Skin Contact	The material can produce chemical burns following direct contact with the skin. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.
Chronic	Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

DREWGARD 315	TOXICITY	IRRITATION
	Not Available	Not Available
sodium molybdate	TOXICITY	IRRITATION
	dermal (rat) LD50: >2000 mg/kg[1]	Not Available
	Oral (rat) LD50: 250 mg/kg[2]	
sodium tolyltriazole	TOXICITY	IRRITATION
	Dermal (rabbit) LD50: >2000 mg/kg(24hr)[2]	Eye (rabbit): Corrosive
	Oral (rat) LD50: 675 mg/kg(female)d[2]	Skin (rabbit): Corrosive
sodium hydroxide	TOXICITY	IRRITATION
	Not Available	Eye (rabbit): 0.05 mg/24h SEVERE
		Eye (rabbit):1 mg/24h SEVERE
		Eye (rabbit):1 mg/30s rinsed-SEVERE
		Skin (rabbit): 500 mg/24h SEVERE
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

SODIUM TOLYLTRIAZOLE	The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. for 50% aqueous solution: * * Bayer
SODIUM HYDROXIDE	The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.
SODIUM MOLYBDATE & SODIUM TOLYLTRIAZOLE & SODIUM HYDROXIDE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation

Continued...

	is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

Acute Toxicity	✔	**Carcinogenicity**	⊘
Skin Irritation/Corrosion	✔	**Reproductivity**	⊘
Serious Eye Damage/Irritation	✔	**STOT - Single Exposure**	⊘
Respiratory or Skin sensitisation	⊘	**STOT - Repeated Exposure**	⊘
Mutagenicity	⊘	**Aspiration Hazard**	⊘

Legend: ✘ *– Data available but does not fill the criteria for classification*
✔ *– Data available to make classification*
⊘ *– Data Not Available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

DREWGARD 315

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

sodium molybdate

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	18.452mg/L	3
EC50	48	Crustacea	3618mg/L	4
EC50	96	Algae or other aquatic plants	49.705mg/L	3
BCF	168	Algae or other aquatic plants	0.025mg/L	4
NOEC	672	Crustacea	0.67mg/L	2

sodium tolyltriazole

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

sodium hydroxide

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	4.16158mg/L	3
EC50	96	Algae or other aquatic plants	1034.10043mg/L	3
NOEC	96	Fish	56mg/L	4

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Prevent, by any means available, spillage from entering drains or water courses.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
sodium molybdate	HIGH	HIGH
sodium hydroxide	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
sodium molybdate	LOW (LogKOW = 2.229)
sodium hydroxide	LOW (LogKOW = -3.8796)

Continued...

Mobility in soil

Ingredient	Mobility
sodium molybdate	LOW (KOC = 48.64)
sodium hydroxide	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ **DO NOT** allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority. ▸ Recycle wherever possible. ▸ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. ▸ Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material) ▸ Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2R

Land transport (UN)

UN number	1719
UN proper shipping name	CAUSTIC ALKALI LIQUID, N.O.S. (contains sodium hydroxide)
Transport hazard class(es)	Class: 8 Subrisk: Not Applicable
Packing group	III
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 223; 274 Limited quantity: 5 L

Air transport (ICAO-IATA / DGR)

UN number	1719
UN proper shipping name	Caustic alkali liquid, n.o.s. * (contains sodium hydroxide)
Transport hazard class(es)	ICAO/IATA Class: 8 ICAO / IATA Subrisk: Not Applicable ERG Code: 8L
Packing group	III
Environmental hazard	Not Applicable

Continued...

Special precautions for user	Special provisions	A3A803
	Cargo Only Packing Instructions	856
	Cargo Only Maximum Qty / Pack	60 L
	Passenger and Cargo Packing Instructions	852
	Passenger and Cargo Maximum Qty / Pack	5 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y841
	Passenger and Cargo Limited Maximum Qty / Pack	1 L

Sea transport (IMDG-Code / GGVSee)

UN number	1719	
UN proper shipping name	CAUSTIC ALKALI LIQUID, N.O.S. (contains sodium hydroxide)	
Transport hazard class(es)	IMDG Class	8
	IMDG Subrisk	Not Applicable
Packing group	III	
Environmental hazard	Not Applicable	
Special precautions for user	EMS Number	F-A , S-B
	Special provisions	223 274
	Limited Quantities	5 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

This substance is to be managed using the conditions specified in an applicable Group Standard

HSR Number	Group Standard
HSR002547	Corrosion Inhibitors (Corrosive) Group Standard 2006

SODIUM MOLYBDATE(7631-95-0) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Workplace Exposure Standards (WES)
New Zealand Inventory of Chemicals (NZIoC)

SODIUM TOLYLTRIAZOLE(64665-57-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

SODIUM HYDROXIDE(1310-73-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Workplace Exposure Standards (WES)
New Zealand Inventory of Chemicals (NZIoC)

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
Not Applicable	Not Applicable	Not Applicable

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities

Continued...

Not Applicable	Not Applicable

Refer Group Standards for further information

Tracking Requirements

Not Applicable

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (sodium molybdate; sodium tolyltriazole; sodium hydroxide)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (sodium molybdate; sodium tolyltriazole)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	*Y = All ingredients are on the inventory* *N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
sodium molybdate	7631-95-0, 10102-40-6
sodium hydroxide	1310-73-2, 12200-64-5

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC－TWA: Permissible Concentration-Time Weighted Average
PC－STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

end of SDS

29 CFR 1910.1200 (OSHA HazCom 2012)

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product identifier

Trade name : Performax™ DC5000
COOLING WATER TREATMENT
™ Trademark, Solenis or its subsidiaries or affiliates, registered in various countries

Recommended use of the chemical and restrictions on use

Use of the Substance/Mixture : Corrosion inhibitor.
Cooling water treatment

Details of the supplier of the safety data sheet	**Emergency telephone number**
Solenis LLC 500 Hercules Road Wilmington, Delaware 19808 United States of America RegulatoryRequestsNA@solenis.com	1-844-SOLENIS (844-765-3647) / 606-329-5705 **Product Information** 1-844-SOLENIS (844-765-3647)

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Corrosive to Metals : Category 1

Skin corrosion : Category 1

Serious eye damage : Category 1

GHS Label element

Hazard pictograms :

Signal Word : Danger

Hazard Statements : May be corrosive to metals.
Causes severe skin burns and eye damage.
Causes serious eye damage.

Precautionary Statements : **Prevention:**
Keep only in original container.
Wash skin thoroughly after handling.
Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
Wash contaminated clothing before reuse.
Absorb spillage to prevent material damage.
Storage:
Store locked up.
Store in corrosive resistant stainless steel container with a resistant inner liner.
Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Chemical nature : Defatter

Hazardous components

SECTION 4. FIRST AID MEASURES

General advice	:	Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance. Do not leave the victim unattended.
If inhaled	:	Move to fresh air. If breathed in, move person into fresh air. Keep patient warm and at rest. If unconscious place in recovery position and seek medical advice. If symptoms persist, call a physician.
In case of skin contact	:	If on skin, rinse well with water. Wash contaminated clothing before re-use.
In case of eye contact	:	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Continue rinsing eyes during transport to hospital. Remove contact lenses. Protect unharmed eye.
If swallowed	:	Get medical attention immediately. Do NOT induce vomiting. Rinse mouth with water. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.
Most important symptoms and effects, both acute and delayed	:	Excessive levels of phosphorus can cause low blood calcium, with tetany and convulsions. No symptoms known or expected. Causes serious eye damage. Causes severe burns.
Notes to physician	:	No hazards which require special first aid measures.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Water spray Foam Carbon dioxide (CO2) Dry chemical

Unsuitable extinguishing media	:	High volume water jet
Specific hazards during firefighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	carbon dioxide and carbon monoxide
Specific extinguishing methods	:	Product is compatible with standard fire-fighting agents.
Further information	:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.
Other information	:	Comply with all applicable federal, state, and local regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Do not breathe vapours/dust. When diluting, always add the product to water. Never add water to the product. Container hazardous when empty. Avoid contact with skin and eyes.

Smoking, eating and drinking should be prohibited in the application area.
For personal protection see section 8.
Dispose of rinse water in accordance with local and national regulations.

Conditions for safe storage : Keep container tightly closed in a dry and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Observe label precautions.
Electrical installations / working materials must comply with the technological safety standards.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
ORGANIC ACID	254504001-5020	TWA	10 mg/m3 Aerosol.	WEEL

Engineering measures : Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects.

Personal protective equipment

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Wear chemical splash goggles and face shield when there is potential for exposure of the eyes or face to liquid, vapor or mist.
Maintain eye wash station in immediate work area.

Skin and body protection : Wear resistant gloves (consult your safety equipment supplier).
Wear as appropriate:
impervious clothing

Chemical resistant apron
Safety shoes
Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Discard gloves that show tears, pinholes, or signs of wear.

Hygiene measures : Wash hands before breaks and at the end of workday.
When using do not eat or drink.
Ensure that eyewash stations and safety showers are close to the workstation location.
When using do not smoke.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Physical state	:	liquid
Colour	:	clear, colourless, light yellow
Odour	:	slight
Odour Threshold	:	No data available
pH	:	2
Melting point/freezing point	:	5 °F / -15 °C
Boiling point/boiling range	:	> 212 °F / > 100 °C (1013 hPa)
Flash point	:	> 200.1 °F / > 93.4 °C Calculated Flash Point
Evaporation rate	:	> 1 Ethyl Ether
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	
Flammability (liquids)	:	Static Accumulating liquid
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available

Vapour pressure	:	< 17.50 mmHg (68.00 °F)
Relative vapour density	:	> 1AIR=1
Relative density	:	+/- 0.01 1.285 (68.00 °F)
Density	:	+/- 0.01 1.27 - 1.3 g/cm3 (68.00 °F)
Solubility(ies)		
Water solubility	:	completely soluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Thermal decomposition	:	No data available
Viscosity		
Viscosity, dynamic	:	10 - 25 mPa.s
Viscosity, kinematic	:	0.128 Stokes
Oxidizing properties	:	No data available
Molecular weight	:	270 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	Stable under recommended storage conditions.
Possibility of hazardous reactions	:	Product will not undergo hazardous polymerization.
Incompatible materials	:	steel strong alkalis
Hazardous decomposition		

products carbon dioxide and carbon monoxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : Inhalation
Skin contact
Eye Contact
Ingestion

Acute toxicity
Not classified based on available information.
Product:
Acute dermal toxicity : LD 50 (Rabbit): > 2,000 mg/kg

Skin corrosion/irritation
Causes severe burns.
Product:
Remarks: Causes severe skin burns and eye damage.

Serious eye damage/eye irritation
Causes serious eye damage.
Product:
Remarks: May cause irreversible eye damage.

Respiratory or skin sensitisation
Skin sensitisation: Not classified based on available information.
Respiratory sensitisation: Not classified based on available information.
Germ cell mutagenicity
Not classified based on available information.
Carcinogenicity
Not classified based on available information.
Reproductive toxicity
Not classified based on available information.
STOT - single exposure
Not classified based on available information.
STOT - repeated exposure
Not classified based on available information.
Aspiration toxicity
Not classified based on available information.
Further information
Product:
Remarks: No data available

Carcinogenicity:

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

Product:

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

General advice : Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Send to a licensed waste management company.

Dispose of in accordance with all applicable local, state and federal regulations.

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Empty containers should be taken to an approved waste handling site for recycling or disposal.
Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

International transport regulations

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.

U.S. DOT - ROAD

UN	3265	Corrosive liquid, acidic, organic, n.o.s. (PHOSPHONIC ACID DERIVATIVE)	8		III

U.S. DOT - RAIL

UN	3265	Corrosive liquid, acidic, organic, n.o.s. (PHOSPHONIC ACID DERIVATIVE)	8		III

U.S. DOT - INLAND WATERWAYS

UN	3265	Corrosive liquid, acidic, organic, n.o.s. (PHOSPHONIC ACID DERIVATIVE)	8		III

TRANSPORT CANADA - ROAD

UN	3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (PHOSPHONIC ACID DERIVATIVE)	8		III

TRANSPORT CANADA - RAIL

UN	3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (PHOSPHONIC ACID DERIVATIVE)	8		III

TRANSPORT CANADA - INLAND WATERWAYS

UN	3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (PHOSPHONIC ACID DERIVATIVE)	8	III

INTERNATIONAL MARITIME DANGEROUS GOODS

UN	3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (PHOSPHONIC ACID DERIVATIVE)	8	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN	3265	Corrosive liquid, acidic, organic, n.o.s. (PHOSPHONIC ACID DERIVATIVE)	8	III

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

UN	3265	Corrosive liquid, acidic, organic, n.o.s. (PHOSPHONIC ACID DERIVATIVE)	8	III

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN	3265	LIQUIDO CORROSIVO, ACIDO, ORGANICO, N.E.P. (PHOSPHONIC ACID DERIVATIVE)	8	III

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Marine pollutant		no

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

SARA 311/312 Hazards : Acute Health Hazard

SARA 313 Component(s)SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65 This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory

DSL : All components of this product are on the Canadian DSL.

AUSTR : On the inventory, or in compliance with the inventory

NZIOC : On the inventory, or in compliance with the inventory

ENCS : On the inventory, or in compliance with the inventory

KECL : On the inventory, or in compliance with the inventory

PHIL : On the inventory, or in compliance with the inventory

IECSC : On the inventory, or in compliance with the inventory

Inventories
AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information
Revision Date: 01/21/2016

Full text of H-Statements referred to under sections 2 and 3.

Further information

Sources of key data used to compile the Safety Data Sheet
Key literature references and sources of data
SOLENIS Internal data
SOLENIS internal data including own and sponsored test reports
The UNECE administers regional agreements implementing harmonised classification for labelling (GHS) and transport.

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by the Solenis Environmental Health and Safety Department.

List of abbreviations and acronyms that could be, but not necessarily are, used in this safety data sheet :

ACGIH : American Conference of Industrial Hygienists
BEI : Biological Exposure Index
CAS : Chemical Abstracts Service (Division of the American Chemical Society).
CMR : Carcinogenic, Mutagenic or Toxic for Reproduction
FG : Food grade
GHS : Globally Harmonized System of Classification and Labeling of Chemicals.
H-statement : Hazard Statement
IATA : International Air Transport Association.
IATA-DGR : Dangerous Goods Regulation by the “International Air Transport Association” (IATA).
ICAO : International Civil Aviation Organization
ICAO-TI (ICAO) : Technical Instructions by the “International Civil Aviation Organization”
IMDG : International Maritime Code for Dangerous Goods
ISO : International Organization for Standardization
logPow : octanol-water partition coefficient
LCxx : Lethal Concentration, for xx percent of test population
LDxx : Lethal Dose, for xx percent of test population.
ICxx : Inhibitory Concentration for xx of a substance
Ecxx : Effective Concentration of xx
N.O.S.: Not Otherwise Specified
OECD : Organization for Economic Co-operation and Development
OEL : Occupational Exposure Limit
P-Statement : Precautionary Statement
PBT : Persistent , Bioaccumulative and Toxic
PPE : Personal Protective Equipment
STEL : Short-term exposure limit
STOT : Specific Target Organ Toxicity
TLV : Threshold Limit Value
TWA : Time-weighted average
vPvB : Very Persistent and Very Bioaccumulative
WEL : Workplace Exposure Level

CERCLA : Comprehensive Environmental Response, Compensation, and Liability Act
DOT : Department of Transportation
FIFRA : Federal Insecticide, Fungicide, and Rodenticide Act
HMIRC : Hazardous Materials Information Review Commission
HMIS : Hazardous Materials Identification System
NFPA : National Fire Protection Association
NIOSH : National Institute for Occupational Safety and Health
OSHA : Occupational Safety and Health Administration
PMRA : Health Canada Pest Management Regulatory Agency
RTK : Right to Know
WHMIS : Workplace Hazardous Materials Information System

MATERIAL SAFETY DATA SHEET

Sodium Hypochlorite Solution 10-15%

ALTIVIA 24 Hour Emergency Phone Number: 713-636-3189
Transportation Emergencies CHEMTREC: 800-424-9300

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**Sodium Hypochlorite Solution 10-15%**
CHEMICAL NAME/ FAMILY:	Sodium Hypochlorite
TRADE NAMES/ SYNONYMS:	Bleach; hypochlorous acid, sodium salt; soda bleach; sodium oxychloride
PRODUCT USE:	Bleaching agent, chemical intermediate, disinfectant.
MOLECULAR FORMULA:	NaOCl
MANUFACTURER:	ALTIVIA, 1100 Louisiana, Suite 4800, Houston, TX 77002

SECTION 2: COMPOSITION/ INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS NUMBER	% RANGE
Sodium Hypochlorite	7681-52-9	9.5 – 16.5
Sodium Hydroxide	1310-73-2	0-1%
Water	7732-18-5	Balance

* Denotes chemical subject to reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Danger! Corrosive. May cause skin and eye irritation or chemical burns to broken skin. Causes eye damage. Harmful if swallowed. Strong oxidizer. Does not burn. Decomposes when heated, during a fire or upon contact with acids releasing corrosive chlorine gas. During a fire corrosive hydrogen chloride gas may be generated.

POTENTIAL HEALTH EFFECTS

EYE
Liquid or mist contact can produce severe eye irritation and burns. Prolonged exposures may cause eye damage and blindness.

SKIN
Can cause irritation and burns. Liquid contact can cause blistering and eczema. Prolonged exposure may cause dermatitis.

INGESTION
Oral or gastrointestinal irritation. Corrosion of mucous membranes, perforation of esophagus and stomach may follow.

INHALATION
Irritation of the respiratory system. Mist or fumes may cause bronchial irritation, coughing, difficult breathing, nausea and pulmonary edema.

SIGNS AND SYMPTOMS OF EXPOSURE
Irritation or burns to the eyes and skin. Inhalation may cause coughing, choking, irritation and pulmonary edema. Sodium hypochlorite solutions are corrosive following ingestion and may cause irritation, burns and vomiting.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
None known.

EFFECTS FOLLOWING REPEATED EXPOSURE
Prolonged contact with sodium hypochlorite may cause dermatitis, permanent eye damage including blindness.

SECTION 4: FIRST AID MEASURES

EYES
Hold eye open and rinse slowly and gently for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Get medical attention for irritation or any other symptom.

SKIN
Take off contaminated clothing and shoes. Rinse skin immediately with plenty of water for 15-20 minutes. Get medical attention for irritation or burns. Wash clothing and thoroughly clean shoes before reuse.

INGESTION
Get immediate medical attention. Have person drink a glass of water immediately if able to swallow. **Do not induce vomiting** unless directed to do so by medical personnel. Do not give anything by mouth to an unconscious person.

INHALATION
Remove person from exposure to fresh air. If person is not breathing, call 911 or an ambulance, and then give artificial respiration (CPR). If individual is breathing, but with difficulty, get immediate medical attention.

NOTES TO PHYSICIAN
The absence of visible signs or symptoms of burns does not reliably exclude the presence of actual tissue damage.

See Section 11 for Toxicological Information.

SECTION 5: FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT
Not combustible (does not burn)

AUTO IGNITION TEMPERATURE
Not Established

FLAMMABLE LIMITS IN AIR (% BY VOLUME)
Not Established

EXTINGUISHING MEDIA
Water, water mist, foam, carbon dioxide, dry powder.

HAZARDOUS COMBUSTION PRODUCTS
Thermal decomposition may release toxic gases such as chlorine and hydrogen chloride gas.

FIRE FIGHTING INSTRUCTIONS
Use extinguishing agents suitable for the surrounding fire and not contraindicated for use with sodium hypochlorite. Sodium Hypochlorite releases oxygen when heated, which may increase the severity of an existing fire. Use water spray to cool fire exposed surfaces and to protect personnel. Avoid inhalation of material or combustion by-products. Firefighters should wear full protective clothing and NIOSH approved positive pressure self-contained breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

WATER SPILL
Prevent additional discharge of material, if possible to do so without hazard.

LAND SPILL
Prevent additional discharge of material, if possible to do so without hazard. For small spills implement cleanup procedures; for large spills implement cleanup procedures and, if in public area, advise authorities.

GENERAL PROCEDURES
No smoking in spill areas. Isolate spill area and deny entry to unnecessary or unprotected personnel. Remove all sources of ignition, such as flames, hot glowing surfaces or electric arcs. Stop source of spill as soon as possible and notify appropriate personnel. Cleanup personnel must wear proper protective equipment (refer to Section 8). Decontaminate all clothing. Notify all downstream water users of possible contamination.

Create a dike or trench to contain all liquid material. Liquid material may be removed with a vacuum truck. Spill materials may also be absorbed using clay, soil or nonflammable commercial absorbents.

Do not place spill materials back in their original container. Containerize and label all spill materials properly.

RELEASE NOTES
Notify the National Response Center (800/424/8802) of uncontained releases to the environment in excess of the Reportable Quantity (RQ). See Section 15, Regulatory Information. Recycle or dispose of recovered material in accordance with all federal, state, and local, regulations.

For all transportation accidents, call CHEMTREC at 800/424-9300.

SECTION 7: HANDLING AND STORAGE

HANDLING

Do not get in eyes, or on skin, or clothing. Do not taste or swallow. Avoid breathing mists or fumes. Do not handle with bare hands.

Carefully monitor handling, use and storage to avoid spills and leaks. Follow protective controls set forth in Section 8 when handling this product. Do not eat, drink, or smoke in work area. Wash hands prior to eating, drinking, or using restroom.

STORAGE

STORAGE CONDITIONS
Store in closed, properly labeled tanks or containers. Keep away from heat, direct sunlight and sources of ignition. Do not remove or deface labels or tags. Store in a cool, well ventilated place away from incompatible materials. Do

not pressurize, cut, heat, or weld containers. Do not drop, roll or skid drums. Keep drums upright. Do not reuse empty containers without commercial cleaning or reconditioning.

STORAGE TEMPERATURE
Do not store above 35°C (95°F).

INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT
Acids, ammonia compounds, oxidizing materials, peroxides, reducing agents and most metals.

SECTION 8: EXPOSURE CONTROLS PERSONAL PROTECTION

ENGINEERING CONTROLS

VENTILATION
Use closed systems when possible. Local exhaust ventilation is recommended if vapors, mists or aerosols are generated.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

EYE AND FACE PROTECTION
Wear chemical goggles. A face shield should be worn in addition to goggles where splashing or spraying is possible.

SKIN PROTECTION
Wear chemical resistant clothing. Neoprene gloves, boots and apron or slicker suit.

RESPIRATORY PROTECTION
A NIOSH approved respirator with N95 (dust, fume, mist) filters may be permissible under certain circumstances where airborne concentrations are expected to exceeded exposure limits, or when symptoms have been observed that are indicative of overexposure.

When decomposition products exist, acid gas cartridges are also required.

A half face piece air-purifying respiratory may be used in concentrations up to 10X the acceptable exposure level and a full face piece air-purifying respirator may be used in concentrations up to 50X the acceptable exposure level.

Supplied air should be used when the level is expected to be above 50X the acceptable level, or when there is a potential for uncontrolled release.

A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

GENERAL
Safety shower and eye wash station must be provided in the immediate work area. Protective equipment and clothing should be selected, used, and maintained according to applicable standards and regulations. For further information, contact the clothing or equipment manufacturer.

EXPOSURE GUIDELINES

Component Data:	Sodium Hypochlorite AIHA (STEL 15 minutes) - 2mg/m^3
Component Data:	Sodium Hydroxide OSHA (TWA) - 2mg/m^3
	Sodium Hydroxide ACGIH Ceiling - 2mg/m^3

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

CHEMICAL FORMULA	NaOCl
MOLECULAR WEIGHT	74.4
APPEARANCE	Clear colorless to pale yellow liquid
ODOR	Characteristic bleach odor
pH @ 25°C	11.5-13.5
VAPOR PRESSURE	Not Established
VOLATILES, % BY VOLUME	Not Established
BOILING POINT	110°C (230°F)
FREEZING POINT	< -12°C (10°F)
SOLUBILITY IN WATER	Complete
EVAPORATION RATE	Not Established
SPECIFIC GRAVITY	1.13-1.27 @ 21°C (70°F)
DENSITY	9.42-10.58 @ 21°C (70°F)
VISCOSITY	Not Established

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY
Stable under normal use conditions. May decompose upon heating and exposure to sunlight.

CONDITIONS TO AVOID
Avoid heat, flames, sparks and other sources of ignition. Avoid direct sunlight, acidic conditions, the presence of metals and other impurities.

INCOMPATIBILITY WITH OTHER MATERIALS
Acids, ammonia compounds, oxidizing materials, peroxides, reducing agents and most metals.

HAZARDOUS DECOMPOSITION PRODUCTS
Thermal decomposition may release toxic gases such as chlorine and hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Will not occur.

SECTION 11: TOXICOLOGICAL INFORMATION

ANIMAL TOXICOLOGY

The toxicity and corrosivity of this material is a function of concentration and pH. This material is irritating and may be corrosive to all tissue.

EYES
Very dilute solutions have caused no irritation. More concentrated solutions have caused corrosive injury, which did not heal within 21 days.

SKIN
LD_{50} (Dermal, Rabbit): > 10,000 mg/m^3 (undiluted)

ACUTE ORAL EFFECTS
LC_{50} (Oral, Female Mouse): ~ 7,540 mg/kg; cited as 5.8 ml/kg (50% solution)

LC_{50} (Oral, Rat): 8,910 mg/kg (undiluted)

ACUTE INHALATION EFFECTS
No available data.

EFFECTS FOLLOWING PROLONGED OR REPEATED EXPOSURE
Dermatitis.

CARCINOGENICITY
This product (or any component at a concentration of 0.1% or greater) is not listed by NTP, IARC, OSHA EPA, or any other authority as a carcinogen.

MUTAGENICITY
No available data.

REPRODUCTIVE/DEVELOPMENTAL TOXICITY
No available data.

SECTION 12: ECOLOGICAL INFORMATION

GENERAL COMMENT
This material is believed to be a moderate order of toxicity based on analogous material.

ENVIROMENTAL FATE
This material is inorganic and not subject to biodegradation. This material is believed not to persist in the environment. This material may be harmful to aquatic organisms in low concentrations.

SECTION 13: DISPOSAL CONSIDERATIONS

SPILL RESIDUES
Processing, use or contamination of this product may change the waste management options. All disposals of this material must be done in accordance with Federal, state and local regulations. Waste characterization and compliance with disposal regulations are the responsibilities of the waste generator. If this product becomes a waste it may be subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D002.

SECTION 14: TRANSPORT INFORMATION

THIS MATERIAL IS A HAZARDOUS AS DEFINED BY 49 CFR 172.01 BY THE U.S DEPARTMENT OF TRANSPORTATION.

DOT IDENTIFICATION NO.: UN 1791

DOT SHIPPING DESCRIPTION (49 CFR 172.101): Hypochlorite solutions, Corrosive, 8

PACKAGING GROUP: III

PLACARD REQUIRED: Corrosive 8, UN 1791

LABEL REQUIRED: Corrosive 8. Label as required by EPA and by OSHA Hazard Communication Standard, and any applicable state and local regulations.

EMERGENCY RESPONSE GUIDE NUMBER: 154

SECTION 15: REGULATORY INFORMATION

U S FEDERAL REGULATIONS

CERCLA REPORTABLE QUANTITY (RQ)

Ingredient	CAS NO.	RQ
Sodium Hypochlorite	7681-52-9	100 lbs
Sodium Hydroxide	1310-73-2	1000 lbs

TSCA (TOXIC SUBSTANCES CONTROL ACT)
All components of this product are listed on the TSCA Inventory or are exempt from TSCA Inventory requirements.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III

SARA SECTION 302 (EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 302.4):
Not Applicable

SARA SECTION 311/312 HAZARD CATEGORIES (40 CFR 370.2):

Fire Hazard	Yes
Reactivity Hazard	No
Release of Pressure	No
Acute Health Hazard	Yes
Chronic Health Hazard	No

SARA SECTION 313 (40 CFR 372.65):
Components identified with an asterisk (*) in Section 2 are subject to the reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.

OSHA PROCESS SAFETY (29 CFR 1910.119):
Not regulated.

OTHER U.S. REGUALATIONS
Federal Insecticide, Fugicide and Rodenticide Act (FIFRA): Registered pesticide (40 CFR 152.10)

INTERNATIONAL REGULATIONS

CANADA

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
DSL/ NDSL: This product, or its components, are listed on or are exempt from the Canadian Domestic Substance List (DSL).

SECTION 16: OTHER INFORMATION

NFPA RATINGS	
HEALTH	3
FLAMMABILITY	0
INSTABILITY	1

HMIS CODES	
HEALTH	3
FLAMMABILITY	0
REACTIVITY	1
PROTECTION	C

RATING NOTES
Hazardous Materials Identification: 4 = Severe, 3 = Serious, 2 = Moderate, 1 = Slight, 0 = Minimal.

Emergency Information:	**For Any Other Information Contact:**
Call toll free 24 hours a day: 713-636-3189	ALTIVIA, Technical Marketing, 1100 Louisiana, Suite 4800, Houston, TX 77002. Phone: 713-658-9000 8 AM – 5 PM CST, Monday through Friday

Revisions

12/28/2005: Revised to conform to ANSI Standard Z400.1-1998, replaces MSDS A2002-05/04.
5/18/2012: Revised Address.

Disclaimer of Warranty:
The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable. ALTIVIA provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration, and investigation. You should satisfy yourself that you have all current data relevant to your particular use. ALTIVIA knows of no medical condition, other than those noted on this material safety data sheet, which are generally recognized as being aggravated by exposure to this product.

ATTACHMENT H

COOLING WATER INFORMATION

OVERVIEW

The Corpus Christi Energy Center (CCEC) obtains raw water from the Corpus Christi Ship Channel. The existing facility is considered a Phase II facility. The plant has a baseload capacity of 398 MW with a peaking capacity of 500 MW.

CCEC uses cooling towers to minimize the volume of cooling water used. Cooling towers are closed-cycle recirculating systems (CCRS) and considered the Best Technology Available (BTA) for the reduction of both impingement and entrainment in cooling water intake structures (CWIS).

The following is included in this attachment:

- H.1 Responses to Worksheet 11.0
  - H.1.1 Cooling Water System Data Section 1.b,
  - H.1.2 Cooling Water Intake Structure Data Section 2.b;
  - H.1.3 Source Water Physical Data 3.b
  - H.1.4 Operational Status 4
- H.2 Responses to Worksheet 11.1 Impingement Mortality
- Appendix H-1 Cooling Water System Maps and Figures
  - Figure H-1 Site Location Map
  - Figure H-2 US Filter General Arrangement Model 45 A
  - Figure H-3 General Arrangement Sea Water Pump House
  - Figure H-4 Source Water Body Hydrological and Geomorphological Features
  - Figure H-5 Water Flow Diagram
- Appendix H-2 Tables
  - Table H-1 Capacity Utilization Rates 2015–2019
  - Table H-2 Actual Intake Flow Data

H.1 RESPONSES TO WORKSHEET 11.0

H.1.1 COOLING WATER SYSTEM DATA

Worksheet 11.0, Section 1.b.i. A narrative description of the design and annual operation of the facility's cooling water system and its relationship to the CWIS(s).

CCEC obtains raw water from the Corpus Christi Inner Harbor and from the City of Corpus Christi. Approximately 85% of the overall water us is from the intake structure, and 15% is from the city. CCEC has one cooling tower that cools the equipment. The system is operated daily.

Worksheet 11.0, Section 1.b.ii .A scaled map depicting the location of each CWIS, impoundment, intake pipe, and canals, pipes or waterways used to convey cooling water to, or within, the cooling water system. Provide the latitude and longitude for each CWIS and any intake pipe(s) on the map. Indicate the position of the intake pipe within the water column.

A map showing the location of the CWIS is included as **Figure H-1** in **Appendix H-1**; the latitude and longitude are 27.817549 and -97.430477, respectively. Drawings of the CWIS (**Figures H-2 and H-3**) are also included in this appendix. The intake screens are located between mean sea level to 14 feet (ft) below mean sea level; see Section H.1.2 for more information regarding the structure itself. **Figure H-4** shows the approximate location of the intake pipe between the CWIS and the facility.

Worksheet 11.0, Section 1.b.iii. A description of water reuse activities, if applicable.

CCEC recycles and reuses water as follows:

- Stormwater from plant areas is used as cooling water makeup.
- Heat recovery steam generator blowdown is used as cooling tower makeup.

The water flow balance for the plant is included as **Figure H-5** in **Appendix H-1**.

Worksheet 11.0, Section 1.b.iv. Design and engineering calculations prepared by a qualified professional and data to support the information provided in above item a.

Design and engineering calculations are not available. If specific calculations are necessary, they can be provided upon request.

Worksheet 11.0, Section 1.b.v. Previous year (a minimum of 12 months) of AIF data.

AIF data are provided in **Table H-1** in **Appendix H-2**.

Worksheet 11.0, Section 1.b.vi. A narrative description of existing or proposed impingement and entrainment technologies or operation measures and a summary of their performance, including, but not limited to, reductions in impingement mortality and entrainment due to intake location and reductions in total water withdrawals and usage.

Cooling towers are the best technology available (BTA) to reduce impingement and entrainment and are used at CCEC. The cooling towers at CCEC have a limited number of cycles due to the fact that saline water is used. The number of cycles averages 1.48.

H.1.2 COOLING WATER INTAKE STRUCTURE DATA

Worksheet 11.0 Section 2.b.i A narrative description of the configuration of each CWIS, annual and daily operation, including any seasonal changes, and where it is located in the water body and in the water column.

The CWIS is operated continuously with little seasonal variation.

The CWIS is comprised of two adjacent concrete wells that are 6.5 ft wide and 17 ft deep. **Figure H-2** in **Appendix H-1** shows the location of the screen within the concrete wells, and **Figure H-3** shows the overall layout of the pumphouse. Please note that the facility was originally constructed with two U.S. Filter Model 45A outside drive traveling screens as shown on **Figure H-2**. The traveling screen did not work well, and they were replaced with a screen having openings of 1 inch x 3 inches. Water that flows through the screens enters the pump house basin that is 72 ft by 24 ft. The pump house has room for six pumps. One pump has been abandoned in place. There are two new horizontal pumps (A and C) and three vertical pumps (A, B, and C).

Worksheet 11.0 Section 2.b.ii. Engineering calculations for each CWIS.

This data is not readily available. The design was done around 2001 by Sargent and Lundy. While some construction drawings were found, the engineering calculations have not been identified.

However, some calculations can be performed based on the information available on the drawings and AIF data. Based on a minimum screen surface area at the low water level (4 ft 9.5 inches x 11 ft = 52.7 ft^2) for both screens (105.4 ft^2) and the maximum monthly water usage from the past year (7.09 MGD or 11 ft^3/sec), the flow velocity through the screen is 0.1 ft/second. This value is less than the 0.5 ft/second that corresponds to the BTA limit for new facilities for impingement (40 CFR 125.84(b)(2). Therefore, although the number of cycles for the cooling towers is somewhat restricted, the facility meets BTA for impingement on two accounts (closed-cycle recirculating system and flow velocity).

H.1.3 SOURCE WATER PHYSICAL DATA

Worksheet 11.0 Section 3.b.i. A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located.

The source water body is the Corpus Christi Ship Channel (also referred to as the Corpus Christer Inner Harbor or Inner Harbor). The channel is 47 ft deep and 400 ft wide. A Corpus Christi Ship Channel Improvement Project authorized in January 2019 will deepen the channel to 54 ft and widen it to 530 ft. The salinity of Corpus Christi Bay is 22 parts per thousand (ppt), lower than the seawater average of 35 ppt. Salinity and temperature regimes for the Inner Harbor were not obtained.

Worksheet 11.0 Section 2.b.ii. Identification and characterization of the source waterbody's hydrological and geomorphological features.

The source water body's hydrological and geomorphological features are as follows:

- The Corpus Christi Inner Harbor is connected to the Corpus Christi Bay and experiences small tidal influences.
- Any natural geomorphological features have been essentially erased due to the dredging of the Inner Harbor.
- Given the small velocity of water through the intake screens (0.1 ft/second), the area of influence within the water body would be expected to be commensurately small.

Worksheet 11.0 Section 2.b.iii. Scaled drawings showing the physical configuration of all source water bodies used by the facility, including the source waterbody's hydrological and geomorphological features. Note: The source waterbody's hydrological and geomorphological features may be include on the map submitted for item 1.b.ii of this worksheet.

A Locational Map is provided as **Figure H-1** in **Appendix H.1**. The physical configuration of the source water body is provided as **Figure H-4** in **Appendix H.1**.

Worksheet 11.0 Section 2.b.iv. A description of the methods used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies.

No physical studies were conducted.

H.1.4 OPERATIONAL STATUS

H.1.4.1 Power Plants

Worksheet 11.0 Section 4.a.i. Describe the operating status of each individual unit, including age of each unit, capacity utilization rate (or equivalent) for the previous five years (a minimum of 60 months) and any seasonal changes in operation.

CCEC has two combustion turbine generators, each with a dedicated duct-fired heat recovery steam generator (HRSG) that supplies steam for the host facility (Elementis Chromium) and to a single steam turbine. Construction of the facility began 15 March 2001 and operation began 16 October 2002. The capacity utilization rates range from 24% to 84% with an average of 57% between January of 2015 to July of 2019. **Table H-2** in **Appendix H-2** summarizes capacity utilization from 2015–2019.

Worksheet 11.0 Section 4.a.ii. Describe any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors.

There have been no extended or unusual outages.

Worksheet 11.0 Section 4.a.iii. Identify an operating unit with a capacity utilization rate less than 8 percent averaged over a contiguous period of two years (a minimum of 24 months).

Utilization rates have not been less than 8 percent.

Worksheet 11.0 Section 4.a.iv. Describe any major upgrades completed within the past 15 years, including, but not limited to, boiler replacement, condenser replacement, turbine replacement, or changes to fuel type.

No major upgrades have been completed in the past 15 years as the plant was constructed in 2002.

H.1.4.2 New Manufacturing Units

Worksheet 11.1 Section 4.d Provide descriptions of current and future production schedules and any plans or schedules for any new units planned within the next five years (a minimum of 60 months) as an attachment.

No manufacturing units are proposed.

H.2 WORKSHEET 11.1 IMPINGEMENT MORTALITY

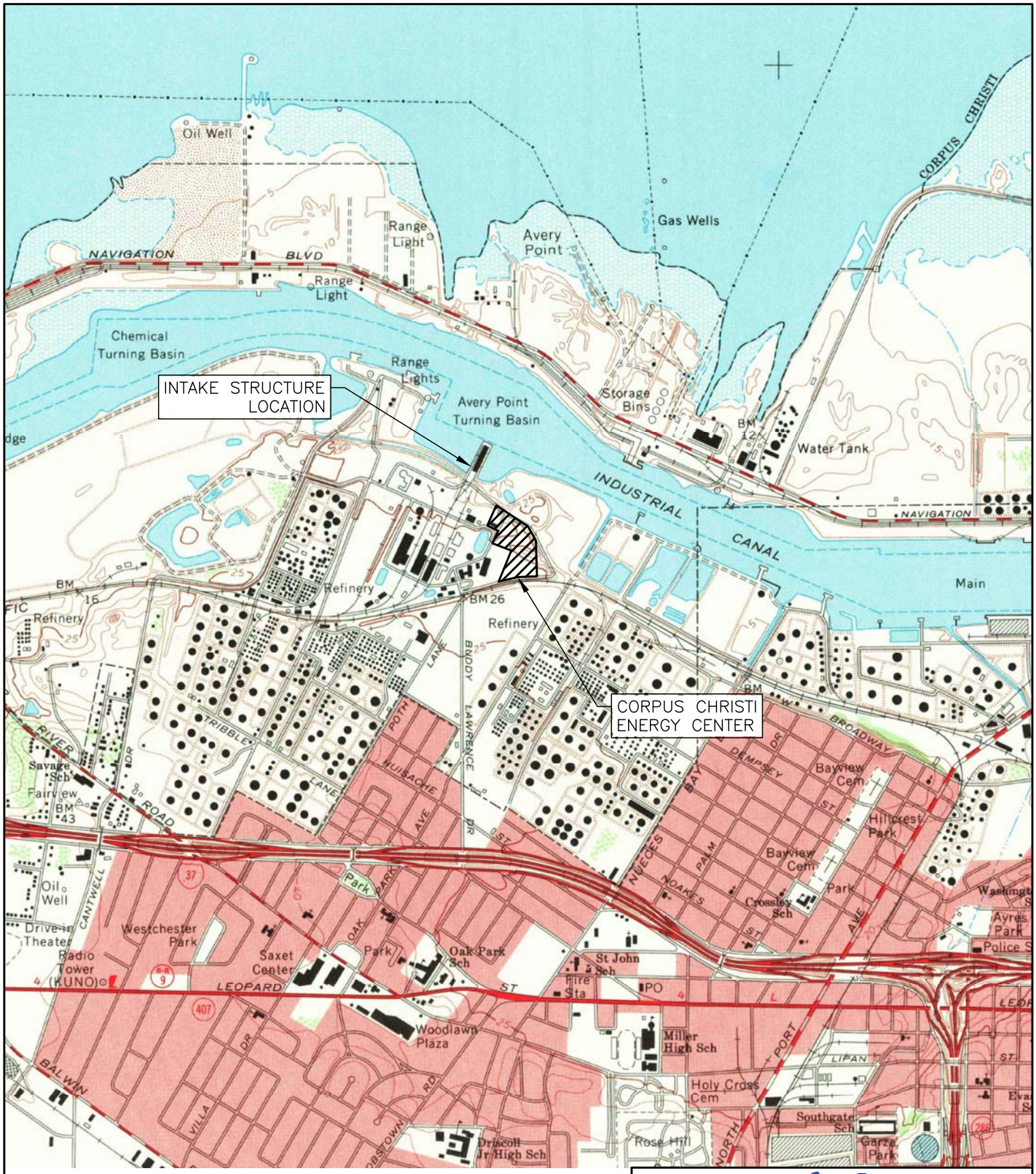
H.2.1 CCRS IMPINGEMENT COMPLIANCE TECHNOLOGY

Worksheet 11.1 Section 2.a.i. Provide the following information in an attachment and continue: 1. CWIS ID; 2. 12 months of intake flow data for any CWIS used for make-up intake flows to replenish cooling water losses, excluding intakes for losses due to blowdown, drift or evaporation; 3. A narrative description of any physical or operation measures taken to minimize make-up withdraws.

The CWIS AIF data are provided in **Table H-1** in **Appendix H-2** for CWIS ID No. 1. All make-up flows are to replenish cooling water losses due to blowdown, drift, or evaporation; the requested data are still provided. The narrative description of physical and operational measures taken to minimize make-up withdrawals is provided in **Section H.1.1**.

APPENDIX H-1

COOLING WATER SYSTEM MAPS AND FIGURES



LEGEND:

APPROXIMATE PROPERTY BOUNDARY

N

0 1000 2000

SCALE IN FEET

SOURCE: USGS 7.5 MINUTE SERIES TOPOGRAPHIC, CORPUS CHRISTI, TEXAS (1971).

WESTON SOLUTIONS

FIGURE H–1

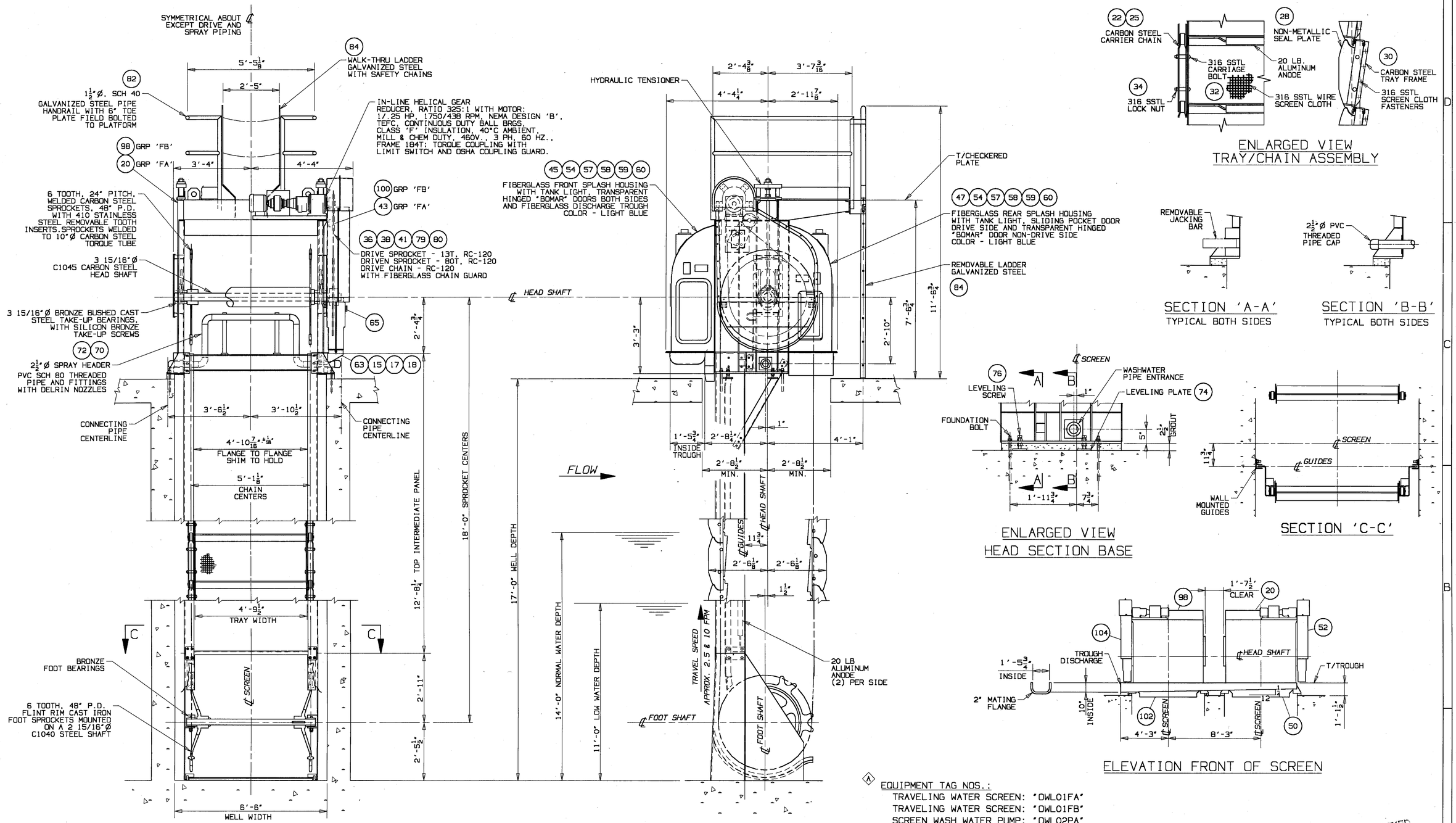
COOLING WATER INTAKE STRUCTURE LOCATION MAP

CORPUS CHRISTI COGENERATION

CORPUS CHRISTI, TEXAS

DATE	PROJECT NO.	SCALE
SEP 2019	14847.010.004.0002	AS SHOWN

X:\Calpine (14847)\14847.010 Corpus Christi\010.004 TPDES Renew\06.0 Data Library\Figures (dwg)\0917191456.dwg Oct 07, 2019 – 11:08am



7 EQUIPMENT TAG NOS.:
TRAVELING WATER SCREEN: "OWL01FA"
TRAVELING WATER SCREEN: "OWL01FB"
SCREEN WASH WATER PUMP: "OWL02PA"
SCREEN WASH WATER PUMP: "OWL02PB"

INDEXED

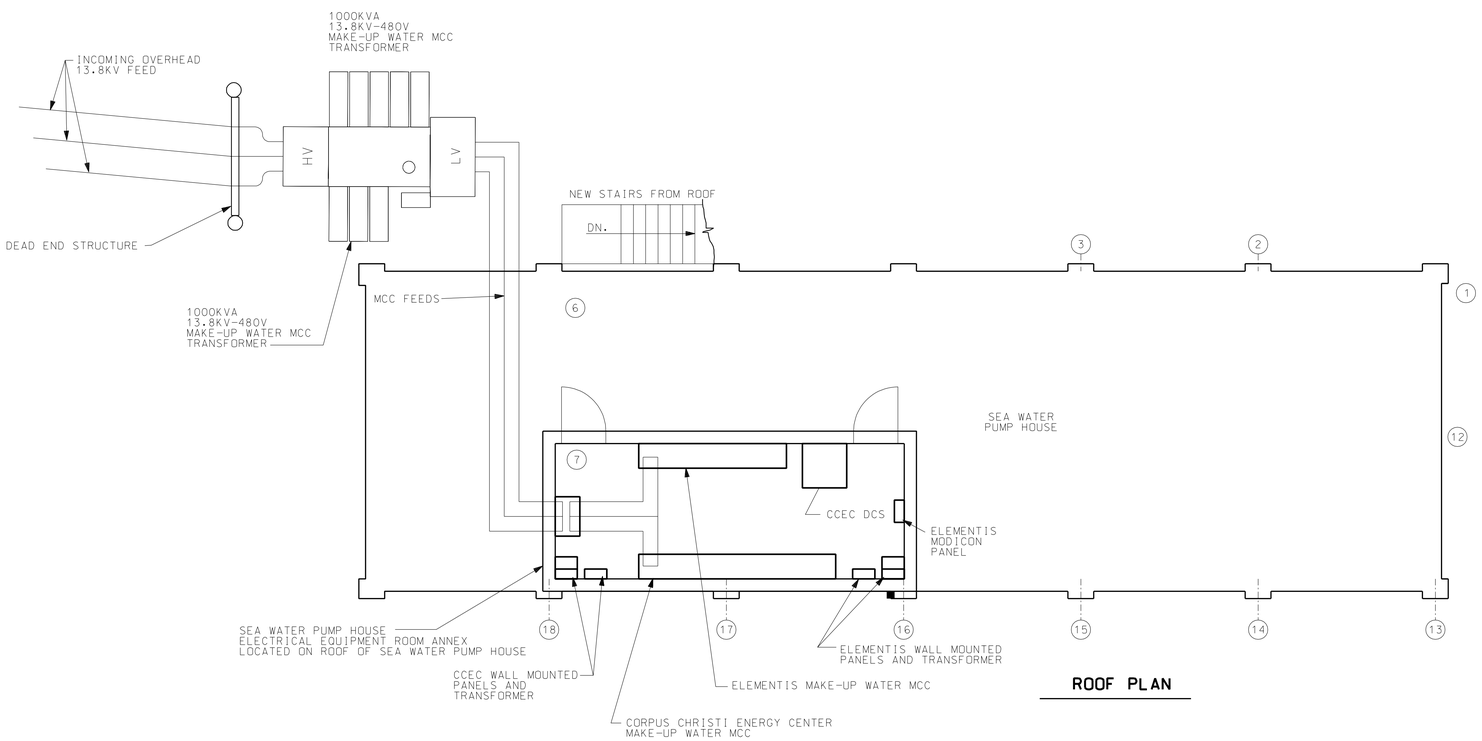
DIMENSIONS IN INCHES UNLESS SPECIFIED							
TOLERANCES UNLESS OTHERWISE SPECIFIED							
TWO (2) PLACE DECIMAL ±.06 THREE (3) PLACE DECIMAL±.005 ANGULAR ±.50°							
STRUCTURAL DIMENSIONS ±1/16 — MACHINED SURFACES 250	A	ADDED EQUIPMENT TAG NOS. AND ITEM NOS.	06/29/01	GD	GD	BH	
	REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN

STD: 2-0799-22x34D | MADE FROM: . | BAR = 1" AT PLOT SCALE

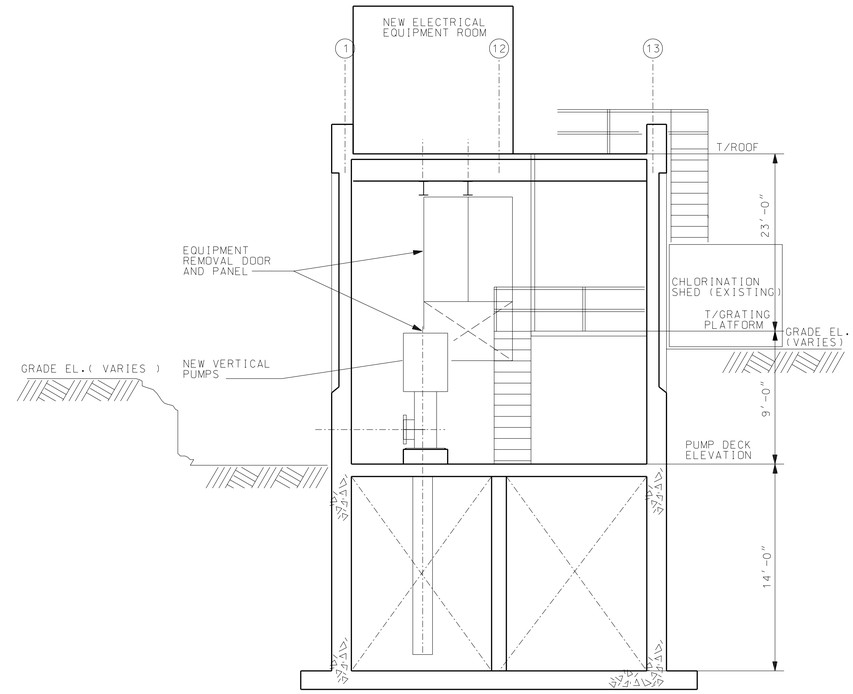
DESIGNER DETWILER	DATE 04/04/01	TITLE GENERAL ARRANGEMENT MODEL 45A OUTSIDE DRIVE TRAVELING WATER SCREEN
CHECKER GD	DATE 04/05/01	CLIENT SLZ CORPUS CHRISTI L. P. FOR CORPUS CHRISTI ENERGY CENTER
ENGINEER	DATE	
MANAGER SBT	DATE 04/06/01	USFilter INTAKE SYSTEMS CHALFONT, PA TEL: 1-800-207-9490
FILE: 30239-101		
SCALE: NONE		PROJECT 30239 · CODE 4042B · DRAWING 30239-101 · SHEET 1 OF 1 · REV 0

30239-101A.cat, 15:06:16, 07/02/2001

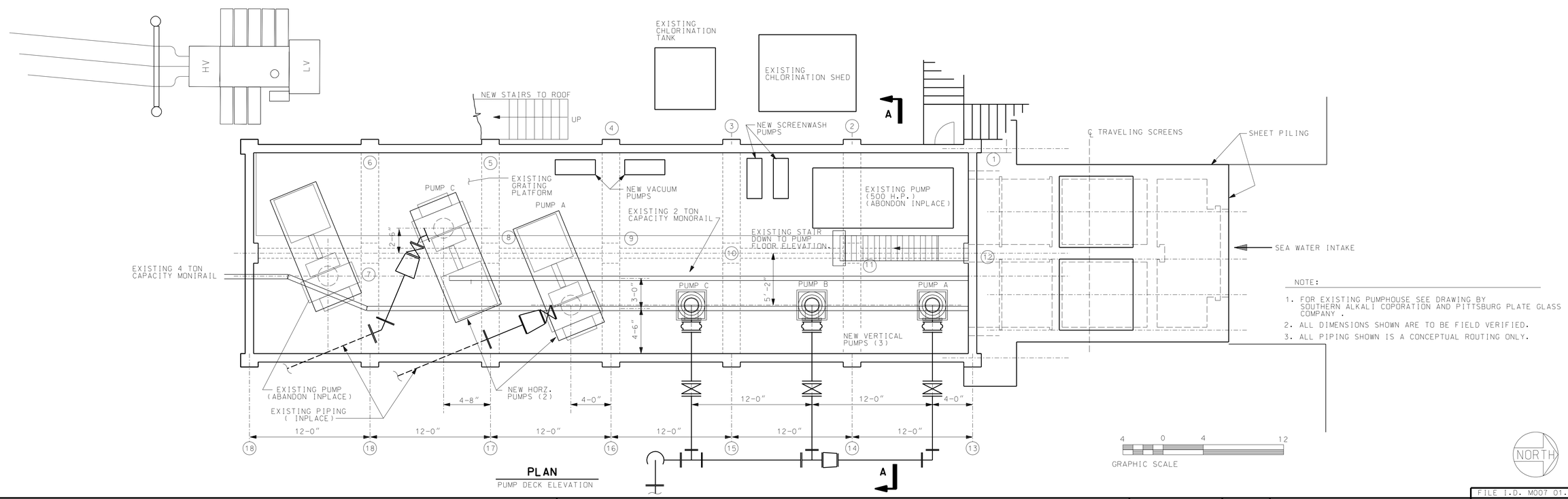
Figure H-2



ROOF PLAN



SECTION "A-A"



PLAN

PUMP DECK ELEVATION

NOTE:

1. FOR EXISTING PUMPHOUSE SEE DRAWING BY SOUTHERN ALKALI COPORATION AND PITTSBURG PLATE GLASS COMPANY .
2. ALL DIMENSIONS SHOWN ARE TO BE FIELD VERIFIED.
3. ALL PIPING SHOWN IS A CONCEPTUAL ROUTING ONLY.

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
0	06-25-2001	G.P.SWITAK	C.SCHWENN	———	FOR CLIENT COMMENTS	

SCALE 1/4"=1'-0"

PROJECT NUMBER 10895-000

GENERAL ARRANGEMENT
SEA WATER PUMPHOUSE

CORPUS CHRISTI ENERGY CENTER
CORPUS CHRISTI COGENERATION LP

FILE I.D. M007 01.DGN

Sargent & Lundy LLC

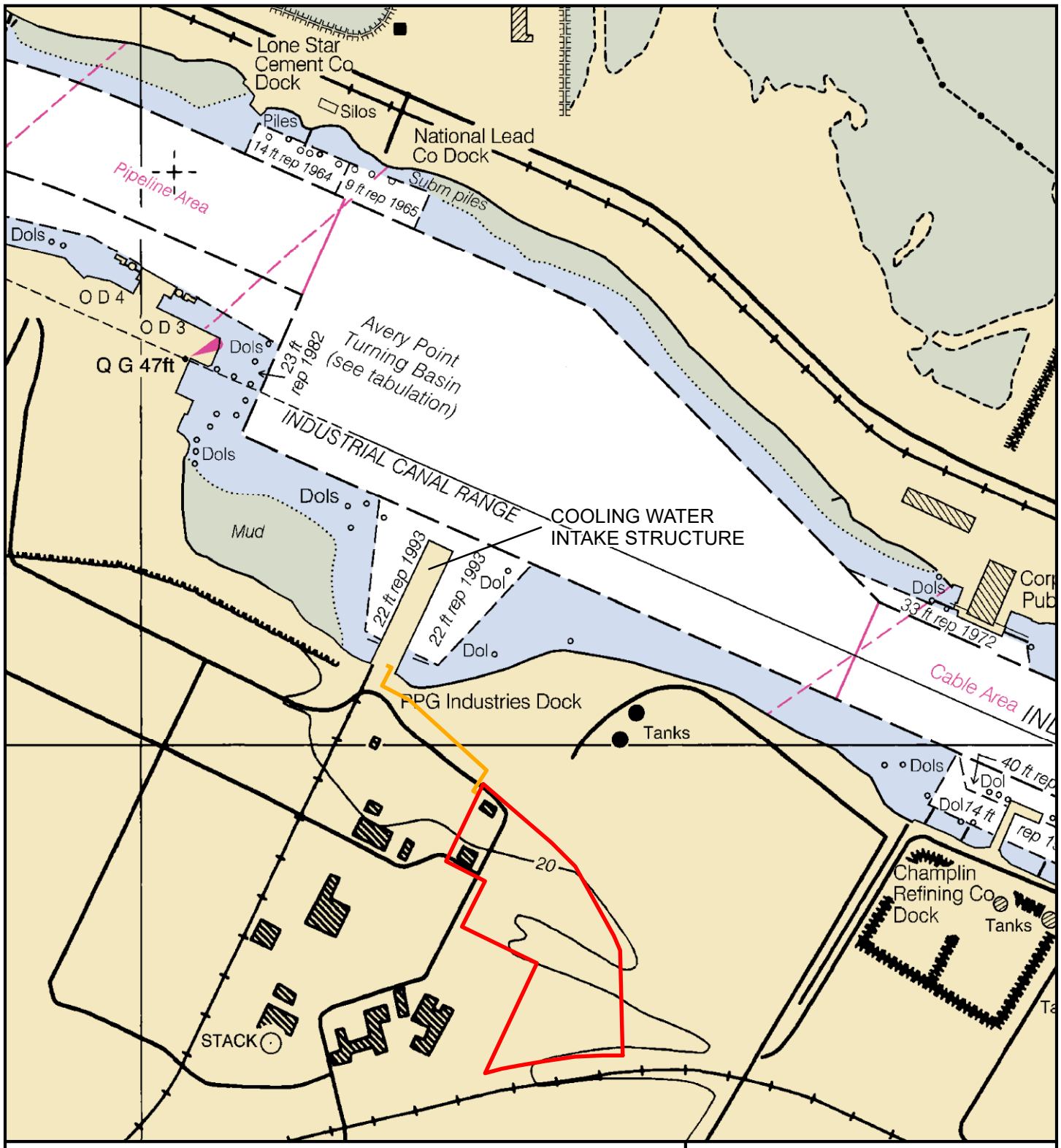
DRAWING NO. M-007 REV. 0

SHEET OF

FORM 005 (Ed. 1 REV. 1 10/93)

.../cadms/design/m007_01.dgn Jul. 02, 2001 09:25:23

Figure H-3



Legend

FACILITY BOUNDARY

COOLING WATER PIPE

Note:
Intake screens are located between water level to 14 feet below water level

N
W E
S

0 600 1,200
Feet

SOURCE: NOAA Seamless Raster Navigational Chart Service

WESTON SOLUTIONS

FIGURE H-4

SOURCE WATER BODY HYDROLOGICAL & GEOMORPHOLOGICAL FEATURES
CORPUS CHRISTI COGENERATION, LLC & CALPINE OPERATING SERVICES COMPANY, INC
CORPUS CHRISTI, NUECES COUNTY, TEXAS

DATE	PROJECT NO	SCALE
Sep 2019	14847.010.004.0002	AS SHOWN

File: D:\GIS\Projects\CorpusChristiEnergyCenter\Maps\Figure H-4 - NOAA Chart.mxd 9/27/2019 02:13 baye

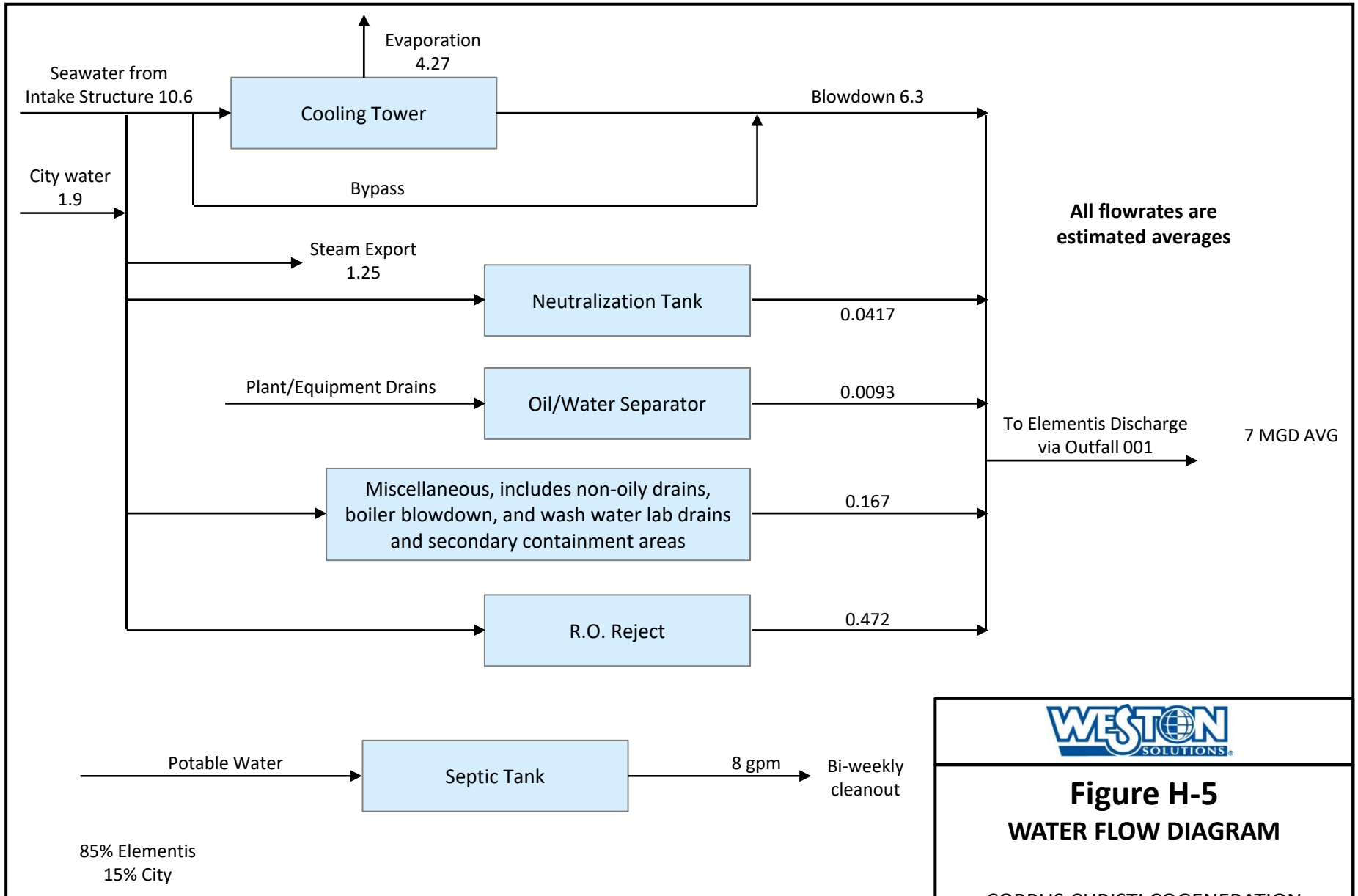


Figure H-5

WATER FLOW DIAGRAM

CORPUS CHRISTI COGENERATION
CORPUS CHRISTI, TEXAS

DATE	PROJECT NO.	SCALE
OCT 2019	14847.004.001.0003	NOT TO SCALE

APPENDIX H-2

TABLES

Table H-1 Actual Intake Flow Data
Texas Water Usage Survey

All numbers taken from the monthly Elementis Report (Operations/CR-Admin/Reports/Elementis/Month.Daily)

All numbers represented in gallons (unless indicated otherwise)

	Cooling Tower Blowdown	Cooling Tower Inlet	Cooling Tower Bypass	Actual Intake Flow	Average MGD From Intake	City Water In	% used for Cooling	# of CT Cyles
Aug 2018	97,578,945	153,470,240	31,397,451	184,867,691	5.96	56,580,318	83%	1.57
Sept 2018	82,243,608	112,691,561	46,344,110	159,035,671	5.30	40,718,249	71%	1.37
Oct 2018	108,389,466	128,218,647	50,738,822	178,957,469	5.77	41,704,097	72%	1.18
Nov 2018	125,379,851	149,607,254	36,513,063	186,120,317	6.20	41,523,967	80%	1.19
Dec 2018	115,031,073	156,563,194	63,257,018	219,820,212	7.09	48,776,758	71%	1.36
Jan 2019	132,623,131	152,645,343	56,000,343	208,645,686	6.73	51,287,769	73%	1.15
Feb 2019	112,155,895	134,498,640	45,824,699	180,323,339	6.44	44,635,017	75%	1.20
Mar 2019	59,912,686	102,645,086	96,395,459	199,040,545	6.42	48,128,417	52%	1.71
Apr 2019	36,850,340	61,839,011	94,891,843	156,730,854	5.22	50,216,553	39%	1.68
May 2019	53,221,861	86,015,416	81,841,234	167,856,650	5.41	53,193,668	51%	1.62
Jun 2019	52,188,319	77,811,100	76,858,588	154,669,688	5.16	49,921,233	50%	1.49
Jul 2019	45,322,876	100,843,436	97,154,527	197,997,963	6.39	49,887,690	51%	2.23
12 month Average					**6.01**		**64%**	**1.48**

Table H-2
Capacity Utilization Rates 2015-2019

Year	Period	Net Actual Generation MW/month	hrs	MW/Hrs	Capacity Utilization [1] (%)
2015	01	174,277	744	234	55%
2015	02	147,506	744	198	47%
2015	03	172,544	744	232	54%
2015	04	185,190	744	249	58%
2015	05	196,776	744	264	62%
2015	06	200,180	744	269	63%
2015	07	208,370	744	280	66%
2015	08	226,489	744	304	71%
2015	09	207,581	744	279	65%
2015	10	195,140	744	262	62%
2015	11	213,669	744	287	67%
2015	12	171,479	744	230	54%
2016	01	192,357	744	259	61%
2016	02	206,938	744	278	65%
2016	03	236,666	744	318	75%
2016	04	154,659	744	208	49%
2016	05	241,866	744	325	76%
2016	06	195,915	744	263	62%
2016	07	238,668	744	321	75%
2016	08	233,121	744	313	74%
2016	09	186,539	744	251	59%
2016	10	209,495	744	282	66%
2016	11	183,256	744	246	58%
2016	12	137,221	744	184	43%
2017	01	184,425	744	248	58%
2017	02	128,373	744	173	41%
2017	03	178,252	744	240	56%
2017	04	104,197	744	140	33%
2017	05	242,180	744	326	76%
2017	06	202,425	744	272	64%
2017	07	243,329	744	327	77%
2017	08	147,144	744	198	46%
2017	09	177,745	744	239	56%
2017	10	225,594	744	303	71%
2017	11	165,698	744	223	52%
2017	12	135,187	744	182	43%
2018	01	155,675	744	209	49%
2018	02	105,665	744	142	33%
2018	03	174,629	744	235	55%
2018	04	182,829	744	246	58%

Table H-2
Capacity Utilization Rates 2015-2019

Year	Period	Net Actual Generation MW/month	hrs	MW/Hrs	Capacity Utilization [1] (%)
2018	05	146,997	744	198	46%
2018	06	192,407	744	259	61%
2018	07	134,949	744	181	43%
2018	08	174,770	744	235	55%
2018	09	205,261	744	276	65%
2018	10	167,822	744	226	53%
2018	11	138,049	744	186	44%
2018	12	266,662	744	358	84%
2019	01	165,335	744	222	52%
2019	02	190,881	744	257	60%
2019	03	157,651	744	212	50%
2019	04	76,983	744	103	24%
2019	05	116,070	744	156	37%
2019	06	112,998	744	152	36%
2019	07	219,374	744	295	69%

[1] Design Capacity 426 MW/hr

ATTACHMENT I

SOURCE WATER PHYSICAL AND BIOLOGICAL DATA

BASELINE BIOLOGICAL CHARACTERIZATION OF THE CORPUS CHRISTI INNER HARBOR IN THE VICINITY OF THE CORPUS CHRISTI COGENERATION PLANT

Prepared for

Calpine
717 Texas Avenue, Suite 1000
Houston, TX 77002

Prepared by

WESTON SOLUTIONS, INC.
5301 Southwest Parkway Suite 450
Austin, Texas 78735
512-651-7100 • Fax 512-651-7101

November 2019

W.O. No. 14847.010.004

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LIST OF FIGURES

LIST OF TABLES

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Section **Page**

LIST OF ACRONYMS

µS/cm	microsiemens per centimeter
C	Candidate Species
CBBEP	Coastal Bend Bays and Estuaries Program
CCEC	Corpus Christi Energy Center
CFS	cubic feet per second
CWA	Clean Water Act
DO	dissolved oxygen
ft	foot or feet
IPAC	Information for Planning and Consultation
LE	Listed Endangered
mg/L	milligrams per liter
NOAA	National Oceanic and Atmospheric Administration
pH	potential of hydrogen
ppt	parts per thousand
SOC	species of concern
T	threatened
T&E	Threatened and Endangered
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife
WESTON	Weston Solutions, Inc.

1 INTRODUCTION

Weston Solutions, Inc. (WESTON®) is pleased to provide this desktop baseline biological characterization report for the Corpus Christi Inner Harbor within the vicinity of the Corpus Christi Energy Center ("CCEC" or "plant," or "energy center") in Nueces County, Texas. The baseline biological characterization was completed in support of Calpine's Texas Pollutant Discharge Elimination System (TPDES) permit renewal (WQ0004158-000). This document was developed following the requirements under the Clean Water Act (CWA) 316(b) Rule for Cooling Water Intake Structures at Existing Facilities, hereinafter referred to as 316(b), and is based upon published literature and available biological and fisheries data. The objective of this report is to provide the Texas Commission on Environmental Quality (TCEQ) with sufficient data to fulfill the requirements of 316(b).

1.1 PURPOSE

The purpose of the study is to characterize the aquatic community within the Corpus Christi Inner Harbor in the vicinity of the energy center that may be impacted by the plant's intake structure, either through impingement or entrainment. Entrainment, as defined by 40 CFR 125.92, is the condition where fish, shellfish, or other aquatic animals are able to fit through intake screens and lack the means to escape the cooling water intake. Impingement is the entrapment of any life stages of fish, shellfish, or other aquatic animals on the outer part of an intake structure or against a screening device during periods of intake water withdrawal.

WESTON conducted a desktop baseline biological characterization literature review. The baseline biological characterization study included the following:

- A list of species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the cooling water intake structure.
- Identification of the species and life stages that would be most susceptible to impingement and entrainment, including the forage base as well as those most important in terms of significance to commercial and recreational fisheries.
- Identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa.

- Identification of all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at the cooling water intake structure.

This report identifies aquatic species most susceptible to impingement and entrainment from operation of CCEC.

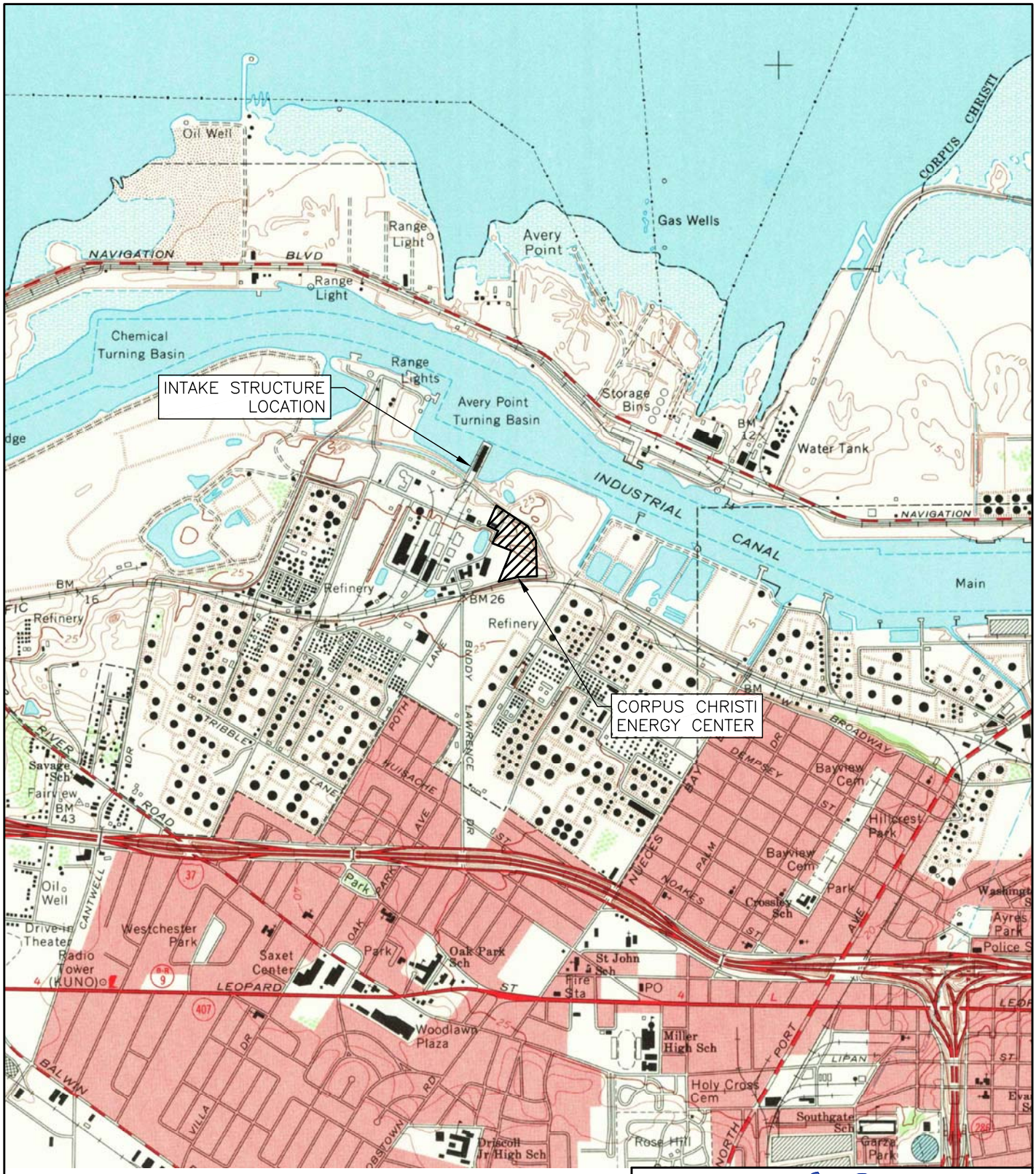
1.2 SITE LOCATION

The energy center is located along TCEQ-designated stream Segment 2484, the Corpus Christi Inner Harbor, in Corpus Christi, Nueces County, Texas. Specifically the energy center intake structure is within the Avery Point Turning Basin of the Inner Harbor. The site's location is shown on **Figure 1-1**.

1.3 LITERATURE REVIEWED

A literature search for the Corpus Christi Inner Harbor was conducted to identify physical characteristics of the water body, surface water quality, fish, and mussel populations, and threatened or endangered species. As a result of the search, surveys of the ship channel for fish and mussels were identified, but no studies were found within the immediate vicinity of the plant. The data presented in this report primarily were derived from the following studies along with information from TCEQ, Texas Parks and Wildlife Department (TPWD), Coastal Bend Bays and Estuaries Program, and the following sources:

- Operational, water quality, and temporal factors affecting impingement of fish and shellfish at a Texas coastal power plant. This report provides details of the species identified as impinged at a nearby intake structure of a power plant over a one year period.
- United States Geological Survey (USGS) and TCEQ water stations located in the inner harbor near the site. The station data were used to provide water quality information for the ship channel.



LEGEND:

APPROXIMATE PROPERTY BOUNDARY

N

0 1000 2000

SCALE IN FEET

SOURCE: USGS 7.5 MINUTE SERIES TOPOGRAPHIC, CORPUS CHRISTI, TEXAS (1971).

WESTON SOLUTIONS

FIGURE 1–1

COOLING WATER INTAKE STRUCTURE LOCATION MAP

CORPUS CHRISTI COGENERATION

CORPUS CHRISTI, TEXAS

DATE	PROJECT NO.	SCALE
SEP 2019	14847.010.004.0002	AS SHOWN

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2 PROJECT AREA SUMMARY

The Corpus Christi Inner Harbor is an approximately 7.5-mile-long, deep water ship channel that is regularly dredged to a depth of 47 feet (ft). The energy center's intake structure is located along a turning basin within the channel that ranges from 400 to 900 feet wide. Based on a United States Army Corps of Engineers (USACE) 2017 Hydro geographic survey, the maximum channel depth is 52 feet in the Avery turning basin. The Corpus Christi Ship Channel Improvement Project authorizes the deepening of the channel to 54 ft, and widening it to 530 ft. The Improvement project was authorized in January 2019. The inner harbor is a constructed channel that runs from the Corpus Christi Bay for 7.5 miles west, where it ends and at the Viola Turning Basin. It is separated from the Nueces Bay to the north by constructed land. The construction of the inner harbor channel began in 1935, and has been lengthened, deepened, and widened over the years (USACE, 2019). The inner harbor is a tidally influenced water classified as an estuary with a direct connection to the Corpus Christi Bay. Land surrounding the inner harbor is constructed, and often contains seawalls, berms, and other methods of erosion prevention along with ship and barge docks. Because of the shipping access to the channel, the water is deep throughout and the shoreline is steep. Shallow vegetated areas are rare. TCEQ classified the inner harbor as having an intermediate aquatic life use (Texas Surface Water Quality Standards, Chapter 307.1). The project area and the surrounding area are highly developed industrial land. Maintenance dredging and project-specific dredging along the channel prevent the permanent establishment of vegetation, and regularly remove or disturb the benthic community. The area does not include ecologically significant habitats.

The plant area is within the Gulf Coast Prairies and Marshes ecoregion of Texas (TPWD, 2019). The region is influenced by its proximity to the Gulf of Mexico, and characterized by shallow bays, estuaries, marshes, dunes, and tidal flats. Vegetation in the region is typically salt tolerant and includes several oak species, sugarberry, sumac, cedar, prickly-pear cactus, crossvine, peppervine, inland sea-oaks, bushy bluestem, gulf cordgrass, and a variety of wildflowers. Near the energy center, vegetation is sparse due to extensive industrial development.

The channel is approximately 400 feet wide from bank to bank at the location where the plant's intake structure is located. The channel depth is currently dredged to 47 feet at the location of the plant. The intake screen is at a depth of 11 to 14 ft in the water column . A Bathymetric map of the Avery Turning Basin in the vicinity of the facility is presented on **Figure 2-1**.

The water flow varies depending on the tide. Based on National Oceanic and Atmospheric Administration (NOAA) data from the USS Lexington station at the entrance to the inner harbor, the tidal variation in water level approximately 1 ft (NOAA, 2019). The inner harbor is most closely similar to the marine and estuarine open water habitat of the Nueces Bay and Corpus Christi Bay. Due to the shape and dredging of the channel, it does not contain shallow water habitats. The water within the area of the intake structure, along with the surrounding bays, is typically turbid. Turbidity rises after storm events. The substrate of the ship channel is muddy lacking other features such as grasses and oyster reefs.

TCEQ maintains water monitoring stations on the inner harbor both upstream and downstream of the site. Results from the monitoring conducted in 2015 (the most recent data) from the Avery Turning Basin station are presented in **Table 2-2** below.

Table 2-1

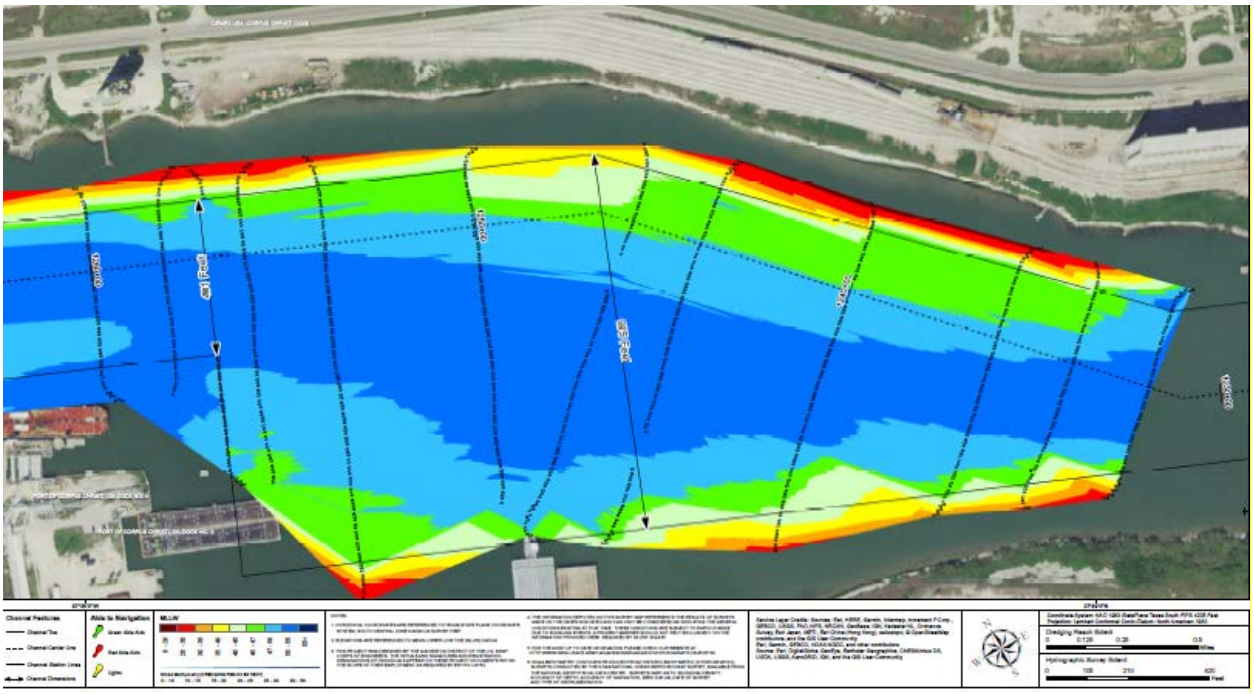
Water Quality Data
Segment 2484 of the Corpus Christi Inner Harbor at Avery Turning Basin
Corpus Christi, Texas

	Specific Conductance	DO	pH	Water Temperature
Date	**µS/cm**	**mg/L**	**Standard Unit**	**Celsius**
2/24/2015	50800	8	7.9	15.7
5/13/2015	35700	6.3	7.9	25.7
7/7/2015	40000	5.8	7.9	28.2

µS/cm microsiemens per centimeter
DO dissolved oxygen
pH potential of hydrogen
CFS cubic feet per second
mg/L milligrams per liter
ppt parts per thousand

Figure 2-1

Bathymetric Map of the Corpus Christi Inner Harbor, Avery Turning Basin Nueces County



Hydrographic Survey conducted 11 April 2019. USACE Galveston District, Avery Point Turning Basin.

Figure 2-2

Water Velocity Reading from the USGS Station

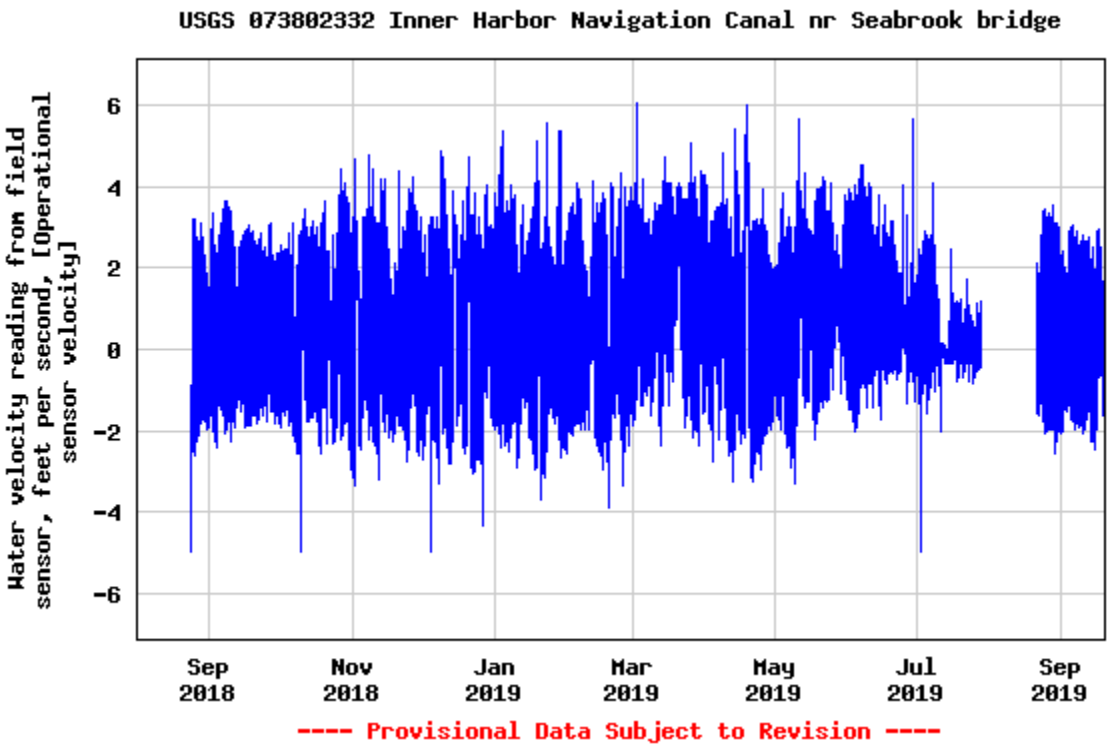
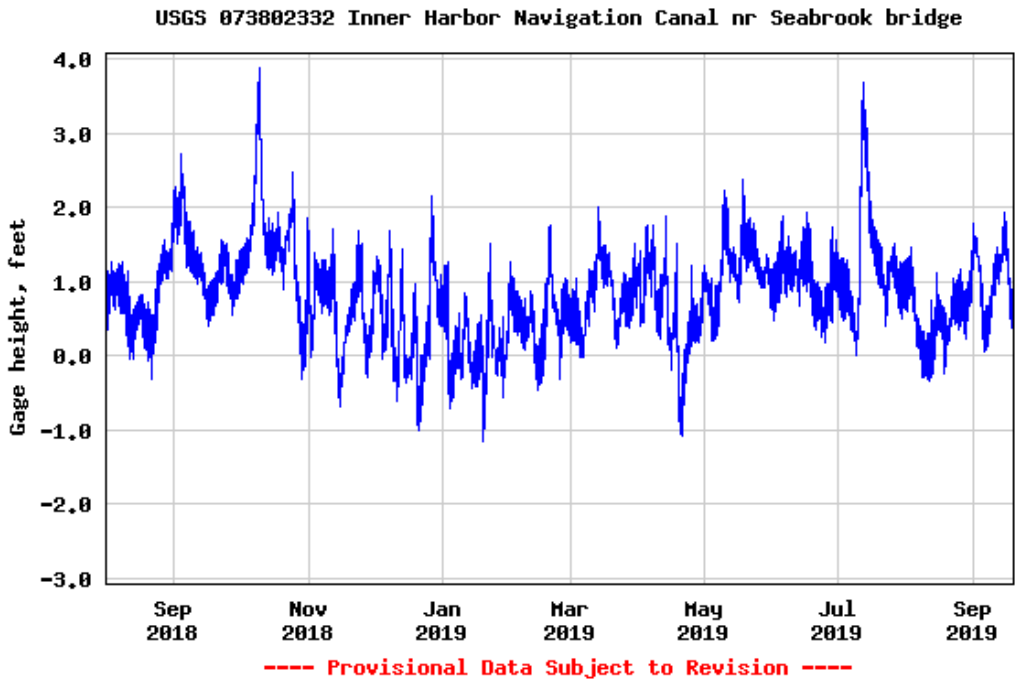


Figure 2-3

Gauge Heights from the USGS Station Inner Harbor Navigational Canal



3 SOURCE WATER BASELINE BIOLOGICAL CHARACTERIZATION

3.1 FISH COMMUNITIES

Information on the fish communities within the area of the intake structure was gathered through a desktop survey of available data. No specific surveys were identified for the inner harbor. Data was collected from the Coastal Bend Bays and Estuaries Program (CBBEP), which provides data and other resources for the coastal bend area including the Nueces Bay; and TPWD, which provides fish species lists for regional waters. In addition to data from the Corpus Christi Bay, information was gathered from studies on similar habitats, including the Galveston Bay, and specifically the Houston Ship Channel. These studies were the primary sources for identifying fish and other wildlife species that may be impacted by the operation of the intake structure at CCEC. The two primary studies are listed below:

Operational, water quality and temporal factors affecting impingement of fish and shellfish at a Texas coastal power plant (2016). This study provides details of species impingement along screens for the Barney M. Davis power plant in Corpus Christi. The power plant is located approximately 20 miles from CCEC, and draws water from the Laguna Madre adjacent to the Corpus Christi Bay. Because the power plant is not within the inner harbor or the shipping channel, a broader variety of habitat is available near the power plant, and therefore, the area has a greater diversity of species, but the results of the study are applicable to CCEC based on the connection of both sites to the Corpus Christi Bay environment. Over the year-long study, it was found that impingement for fish species was most closely associated with the dissolved oxygen, the sampling month, and the sampling time. For shellfish species, the sampling month and time were the most important factors. The intake flowrate, and the number of screens operating did not predict impingement.

Non-Fishing Human Based Mortality of Fisheries of Galveston Bay (1993). This study provided detailed data of fish and shellfish impingement and entrainment at four locations within the Galveston Bay, one of which was in the Houston Ship Channel that closely mirrors the habitat and bathymetric conditions of the Corpus Christi Inner Harbor. The data was collected over two years, 1978 through 1979. Although factors affecting the habitat may have changed over the years, the

fish species present and the relative abundance of those affected by the water intakes are applicable data to evaluate the potential for fish impingement and entrainment at CCEC.

Based on the above studies, and data from the TPWE, a list of fish species potentially present in the inner harbor and adjacent Corpus Christi Bay is in **Table 3-1**.

Table 3-1

Fish Species Potentially Present in the Inner Harbor in the Vicinity of the Corpus Christi Energy Center

Species Name	Common Name
Leiostomus xanthurus	spot
Pogonias cromis	black drum
Arius felis	catfish
Sciaenops ocellatus	red drum
Anchoa mitchilli	bay anchovy
Lagodon rhomboids	pinfish
Micropagonias undulatus	Atlantic croaker
Brevoortia patronus	gulf menhaden
Elops saurus	ladyfish
Cynoscion arenarius	sand seatrout
Stellifer lanceolatus	star drum
Cynoscion nebulosus	spotted seatrout
Sciaenops ocellatus	red drum
Paralichthys lethostigma	southern flounder
Morone saxatilis	striped bass
Archosargus probatocephaus	sheephead
Mugil cephalus	striped mullet

3.2 INVERTEBRATES COMMUNITY

Shrimp, oysters, crab, and mussels are present in various life stages in the Nueces and Corpus Christi Bay. None are listed under the Endangered Species Act.

Table 3-2

Invertebrate Species Potentially Present in the Corpus Christi Inner Harbor Nueces County

Species Name	Common Name
Penaeid spp.	Panaeid shrimp
Trachycaris rugosa	Roughback shrimp
Stomatopoda sp	Mantis Shrimp
Callinectes sapidus	Blue crabs
Farfantepenaeus aztecus	Brown shrimp
Penaeus setiferus	White Shrimp
Palaemonetes pugio	Grass shrimp

3.3 THREATENED & ENDANGERED (T&E) SPECIES

The United States Fish and Wildlife Service (USFWS) Southwest Region list of federally listed T&E species for Nueces County (USFWS, 2019) was reviewed to evaluate potential species occurrences and their critical habitat in their respective listed counties. The USFWS Information for Planning and Consultation (IPaC) tool was also consulted for federally listed species with ranges that may overlap with the project area. The preferred habitat for each listed species was assessed and compared to the characteristics of the project area to establish the likelihood of the listed species inhabiting the project area. A list of the State-listed T&E species, State-designated species of concern (SOC), and a description of their associated habitats were obtained from the TPWD website (TPWD, 2016). T&E species with aquatic habitats listed for Nueces County are detailed in **Table 3-3**.

Table 3-3

Federal and State Listed Aquatic Species for Nueces County, Texas

Scientific Name	Common Name	Federal Status	State Status	Habitat Description	Possible Occurrence
Mammals					
Trichechus manatus	West Indian Manatee	LT	-	Gulf and bays in south America and Florida, very rare in Texas.	Not Likely
Reptile Species					
Chelonia mydas	Green Sea Turtle	LT	T	Found in gulf and bay systems in shallow water seagrass beds, open water between feeding and nesting areas, and on barrier island beaches.	Not Likely
Eretmochelys imbricata	Hawksbill Sea Turtle	LE	E	Found in gulf and bay systems in warm shallow waters, especially in rocky marine environments such as coral reefs and jetties.	Not Likely
Lepidochelys kempii	Kemp's Ridley Sea Turtle	LE	E	Found in gulf and bay systems with adults staying within shallow waters in the Gulf of Mexico.	Not Likely
Dermochelys coriacea	Leatherback Sea Turtle	LE	E	Found in gulf and bay systems. Has the widest range of any open water reptile.	Not Likely
Caretta caretta	Loggerhead Sea Turtle	LT	T	Juveniles are found in gulf and bay systems whereas adults are the most pelagic of the sea turtles.	Not Likely
Fish					
Microphis brachyurus	Opossum Pipefish	--	T	Brooding adults found in fresh or low salinity waters and young move or are carried into more saline waters after birth; southern coastal areas.	Not Likely

C Candidate Species
LE Listed Endangered
T Threatened

Leatherback sea turtles are limited to deep water habitats and, although the turtles could be within Nueces Bay system, they are not expected to be within the inner harbor. Likewise, hawksbill sea turtles prefer rocky habitats and coral reefs and may be found within in the Nueces Bay system; however, they are not expected to be within the inner harbor. Loggerhead, green, and Kemp's Ridley sea turtles utilize coastal bodies of water that are tidally influenced and have been observed in the Nueces Bay system, but it is unlikely that they would enter the inner harbor. There is no habitat nearby that is suitable for sea turtle nesting. Adult sea turtles are extremely unlikely to be impinged or entrapped, but hatchling are susceptible. Due to the lack of nesting habitat near the

CCEC intake, hatchlings are not expected to be within the inner harbor, and therefore the likelihood of impingement or entrapment is very low.

3.4 REPRODUCTION (SPAWNING AND RECRUITMENT) AND SEASONALITY

Spawning within the Corpus Christi and Nueces bays varies for different species. Due to the lack of shallow water, lack of vegetation, and the high volume of ship traffic within the inner harbor, none of the fish species are expected to use the area near the energy center for spawning habitat.

4 SPECIES SUSCEPTIBLE TO IMPINGEMENT OR ENTRAINMENT AT THE SITE

"Fragile species," those that are least likely to survive any form of impingement are defined in 40 CFR 125.92(m). Evaluation of a species' susceptibility to impingement or entrainment depends on numerous factors both in the environment and of the species. These factors include water quality indicators such as temperature, dissolved oxygen, turbidity, intake velocities and screen mesh size, and life history characteristics such as swimming behavior, size, health, seasonal movements, and spawning habitats (Graham et al., 2008).

Fish may suffer from impingement as juveniles or as adults. Entrainment is usually a more significant issue; larva and hatchlings are more susceptible to entrainment (Moser and Watson, 2006). All species are more susceptible to impingement when smaller, both as a species and as individual fish. Therefore, impingement rates are generally higher in mid to late summer and early fall because of the high number of young individuals who are not yet strong enough swimmers to maneuver the current of the intake structures (Griffith and Tomljanovich, 1975).

Fish impingement is also related to both dissolved oxygen levels in the water, and temperature. Lower DO, typically in the summer or fall, changes fish swimming behavior and can increase rates of impingement. Water temperature, either extremely warm or extremely cold, influences impingement rates.

Although all fish species are considered susceptible at some developmental stages and under certain water quality conditions, some species are considered to be susceptible to potential impingement or entrainment considering species-specific characteristics.

The species most frequently affected by intake operations typically coincided with those that are probably most abundant in the area. Based on previous studies these species may include white shrimp *(Penaeus setiferus),* blue crab *(Callinectes sapidus),* Gulf menhaden *(Brevoortia patronus),* bay anchovy *(Anchoa mitchilli),* sand seatrout *(Cynoscion arenarius),* spot *(Leiostomusxanthurus),* and Atlantic croaker *(Micropogonias undulatus).* Species less frequently impinged based on previous studies included sea catfish *(Ariusfelis),* and striped mullet *(Mugil cephalus).* Species such as spotted seatrout *(Cynoscion nebulosus),* black drum *(Pogonias cromis),*

red drum *(Sciaenops ocellata)*, and southern flounder *(Paralichthys lethostigma)* are infrequently impinged.

The fish species potentially present near the CCEC intake, and their potential for impact by impingement or entrainment based on the results from the Corpus Christi energy plant and the Galveston Bay/Houston Ship Channel studies are provided in **Table 4-1**:

Table 4-1

Species Most Likely to be Potentially Impacted by Impingement/Entrainment

Species Name	Common Name	Presence	Entrainment/Impingement Susceptibility
Leiostomus xanthurus	spot	Moderate	Greater due to size and abundance
Pogonias cromis	black drum	Unlikely	Low, unlikely in the inner harbor
Arius felis	catfish	Unlikely	Low, unlikely in the inner harbor
Sciaenops ocellatus	red drum	Unlikely	Low, unlikely in the inner harbor
Anchoa mitchilli	bay anchovy	Abundant	Greater due to size and abundance
Lagodon rhomboids	pinfish	Low	Moderate due to size, but likely low abundance
Micropagonias undulatus	Atlantic croaker	Abundant	Moderate due to abundance and size
Brevoortia patronus	gulf menhaden	Moderate	Moderate for juveniles
Cynoscion arenarius	sand seatrout	Abundant	Greater due to size and abundance
Stellifer lanceolatus	star drum	Low	Low, due to probably low population
Cynoscion nebulosus	spotted seatrout	Unlikely	Low, unlikely in the inner harbor
Sciaenops ocellatus	red drum	Unlikely	Low, unlikely in the inner harbor
Paralichthys lethostigma	southern flounder	Unlikely	Low, unlikely in the inner harbor
Penaeid spp.	panaeid shrimp	Low	Moderate, less abundant in the inner harbor
Farfantepenaeus aztecus	brown shrimp	Unlikely	Low, unlikely in the inner harbor
Penaeus setiferus	white shrimp	Moderate	Moderate due to size and abundance
Callinectes sapidus	blue crabs	Abundant	Greater due to size, abundance and larval form
Palaemonetes pugio	grass shrimp	Unlikely	Low, unlikely in the inner harbor

Presence and susceptibility were based on the results of data collected by the Galveston Bay National Estuary Program, and the Shepherd et al study*: Operational, water quality and temporal factors affection impingement of fish and shellfish at a Texas coastal power plant*.

Descriptions of species that may have specific susceptibility are provided below.

Bay Anchovy

Bay anchovy is a schooling fish found throughout the Corpus Christi Bay. Bay anchovy between 20 millimeters (mm) and 50 mm are most susceptible to entrainment. They are the most affected between May and September. Impingement is highest for individuals between 20 mm and 65 mm. The anchovies are at a relatively higher risk when the populations are high during early spring.

Bay anchovy was the second highest impinges species during the Corpus Christi Power Plant study (Shepard et al, 2016). They made up two percent of the impinged species in the Houston Ship Channel study location.

Gulf Menhaden

Gulf menhaden is a schooling fish found through the Gulf of Mexico. In previous studies, Gulf menhaden were identified as more vulnerable to impingement or entrainment. Gulf menhaden less than 30 mm length are most susceptible to entrainment. Gulf menhaden are more susceptible to impingement when water temperatures are colder, typically January through April, and when the abundance of juveniles is high. The population of juveniles in the inner harbor is not expected to be high because they prefer shallow estuarine waters during early life stages.

Sea Catfish

Sea catfish are not expected to be highly vulnerable to impingement or entrainment due to their body size and habitat use. They are the most vulnerable during the late summer and fall, which coincides with the release of young from the oral gestation by the male of the species. Typically the young are released between 35 mm and 40 mm. By the time they are 50 mm, they are no longer susceptible to entrainment. Impingement still occurs for individuals up to 80 mm. Sea catfish were not reported as impinged in either the Corpus Christi Power Plant study, or the Houston Ship Channel study.

Sand Seatrout

Sand seatrout are common throughout the Gulf of Mexico. Juveniles are most abundant in estuaries in the fall. Juveniles are most susceptible to impingement and entrapment. Although the species is abundant, its life history and habitat preference result in entrainment risk being low for CCEC. Those affected are typically less than 30 mm. Sand seatrout between 35 mm and 175 mm are at the highest risk for impingement. Rates of impingement are typically highest in the summer due to higher populations. Sand seatrout were not reported as impinged in the Corpus Christi Power Plant study, but were reported in the Houston Ship Channel at relatively low numbers.

Spot

Spot is a schooling fish common throughout the Gulf of Mexico. Spot are at a greater risk of entrainment and impingement due to their size and abundance in the gulf. In the Corpus Christi Power Plant study, spot were the most frequently impinged species (Shepard et al, 2016). Spot less than 30 mm are most at risk of entrainment. The risk is greatest in the spring when the abundance of juvenile spot is present. Young spot less than 70 mm are the most at risk of impingement. In previous studies, the highest periods of impingement occurred from late summer through early winter.

Atlantic Croaker

Based on previous studies, the Atlantic croaker size most susceptible to entrainment was less than 30 mm during peak periods of recruitment from March through April and January through March (GBNEP, 1993; Shepard et al, 2016). Atlantic croaker between 30 mm and 65 mm are at the greatest risk of impingement. Atlantic croaker were 2.6 percent of the total fish impinged during the Corpus Christi Power Plant study, and were the most abundant species impinged in the Houston ship channel study location at over 75 percent of individuals.

Drum and Flounder Species

Neither black, star or red drum, or flounder were reported as impinged in the Corpus Christi Power Plant study. Although red, star and black drum and flounder were reported as impinged in other areas of the Galveston Bay system, none were reported impinged in the Houston Ship Channel. The juveniles of drum species are present in estuaries and inlets, but adults are typically in offshore coastal waters.

Shrimp species

Only white shrimp were reported impinged in the Houston Ship Channel study, ranging in size of 30 to 60 mm. They were more common in winter. Shrimp impingement is greater in the evening hours likely due to nocturnal patterns. They typically burrow during the day and emerge at night. Brown, Penaeid, and Caridean shrimp were identified in the Corpus Christi Power Plant study,

with highest impingement rates in the winter. Shrimp are unlikely in the Inner harbor due to the lack of appropriate habitat, and the disturbed benthic environment. Early life stages are most susceptible, and are most abundant in shallow estuarine habitats.

Blue Crab

Blue crab were reported as relatively abundant as impinged in Houston Ship channel study at greater than 10 percent of species impinged. They were more frequently impinged in the winter. Blue crab made up 1.1 percent of species impinged in the Corpus Christi Power Plant study. Spawning for blue crabs peaks in spring and summer. They are common throughout the Corpus Christi Bay system, at depths up to 120 ft. They are bottom dwellers. The larval stage is the most at risk of impingement.

5 CONCLUSION

This desktop baseline biological characterization report for the Corpus Christi Inner Harbor within the vicinity of the Corpus Christi Energy Center in Neches County, Texas, was performed to describe the biological community present within the Inner Harbor in the vicinity of the plant intake, based on the available literature. The baseline biological characterization was completed in support of Calpine's TPDES permit renewal (WQ0004158000), following the requirements under the CWA 316(b) Rule for Cooling Water Intake Structures at Existing Facilities.

There has not been a thorough study of the aquatic community within the vicinity of the plant's intake structure. The intake structure is located along an industrial ship channel that is regularly dredged to be maintained at a depth of 47 ft. The inner harbor is surrounded on both sides by industry similar to CCEC. Wildlife in and around the inner harbor is limited to those species that are adapted to industrial activities. The wildlife abundance and diversity present in the inner harbor are much lower than that of the surrounding Nueces and Corpus Christi Bays. Within the inner harbor, the aquatic habitat is limited to deep water habitat, with little vegetation, and a regularly disturbed benthic community. The fish that are expected near the plant are likely typical of resilient species found in the Corpus Christi and Nueces Bay's deep water habitats. Fish species present in the vicinity of the intake structure may be susceptible to being impinged or entrained during specific life stages, primarily as larval stages or small juveniles. Due to the lack of desirable spawning habitat within the inner harbor, hatching and juveniles of any fish species are not likely in the vicinity of CCEC's intake structure.

Although the listed turtle species could be present within the vicinity of the plant in the inner harbor, sightings of sea turtles within the inner harbor are rare. Adult turtles are not likely to be impinged or entrapped, but hatchlings are susceptible. There is no turtle nesting habitat within the inner harbor; therefore, the likelihood of turtles being affected by the intake structure is very low. The location of the intake in the inner harbor of the Corpus Christi Ship Channel provides no specific threat to any species and is unlikely to have a significant impact on the biological community. Data presented in this report provide a sufficient understanding of which species may be impacted by impingement or entrainment due to the plant intake structure. Additional biological

surveys or hydrological studies are not considered necessary to describe the physical and biological aspects of the source waterbody to support compliance with 316(b).

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