version

(Submission #: HNB-XN56-W2PQG, version 9)

Summary

Submission #:	HNB-XN56-W2PQG	**Date Submitted:**	8/6/2019 1:06 PM
Form:	version (General Application for a UIC Permit to Operate)	**Status:**	Submitted
Submitted By:	Dennis Poma	**Submission Creator:**	Dennis Poma
Active Steps:	Administrative Review & Assign Staff (Submission Details-Processing History Page)		
File/Reference #:		**Reference #:**	
Description:	Hu Honua General Application for a UIC Permit to Operate		

Notes

Details

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
file number assigned to the application–UH-3051

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
recent news indicate that facility name has changed to "Honua Ola." Is the name in the application still applicable? If not, then you need to change the facility name inn this application.

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **4/23/2018** *(Applicant Action Required)*
change the file number to UH-3051

Facility

Facility Name:

Hu Honua Bioenergy, LLC

UIC Permit or File Number (if already assigned):

UH-3051

Facility Description:

State-of-the-Art bioenergy facility that will provide renewable energy to support Hawaii's clean energy goals. Hu Honua proposes to generate up to 21.5 megawatts net (25.2 megawatts gross) of electric power fueled by renewable sources. The facility will require non-contact cooling water supplied by up to four saline water supply wells (State Nos. (8-5005-03 through 05 and 09). Water requirement is up to 21.6 MGD for cooling to be discharged into three (3) UICs on site.

Location

19.8433429,-155.0864315
NONE PROVIDED

USGS Topographic Map- Attachment

Fig1_vicinity_map.pdf - 02/26/2018 08:47 PM

HHB Well Location Map.pdf - 03/19/2019 04:27 PM

Comment: NONE PROVIDED

Site Plan- Attachment

20190401 UH 3051 HU HONUA SITEPLAN In.pdf - 08/06/2019 12:43 PM

726004C901 Rev 2 Cooling Water Return Plan Sections and Details (2)-v6(1).pdf - 08/06/2019 12:44 PM

Comment: Two site plans are provided. The first is an aerial showing well locations with Lat/Long information. The second is drawing showing the UIC discharge line and well locations.

Site Location Details

28-283 Sugar Mill Road, Pepeekeo, HI 96783

TMK Map- Attachment

TMK Map.pdf - 02/26/2018 08:49 PM

Comment: NONE PROVIDED

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
Is the owner name still okay?

Owner

Owner Name:

Hu Honua Bioenergy, LLC

Owner Position Title

Owner

Company Name

Hu Honua Bioenergy, LLC

Person filing the application

Represenative of Applicant (consultant, professional service)

Primary address of the owner

28-283 Sugar Mill Road
Pepeekeo, Hawaii 96783

Phone number (e.g., 555-555-5555):

808-964-1101

Fax number (e.g., 555-555-5555):

808-964-5221

Email:

WLee@huhonua.com

Land Interest

Describe the facility's interest in the land on which the facility is built. If the applicant and the fee simple land owner are NOT the same entity, complete the Fee Simple Land Owner Section.

Property Type

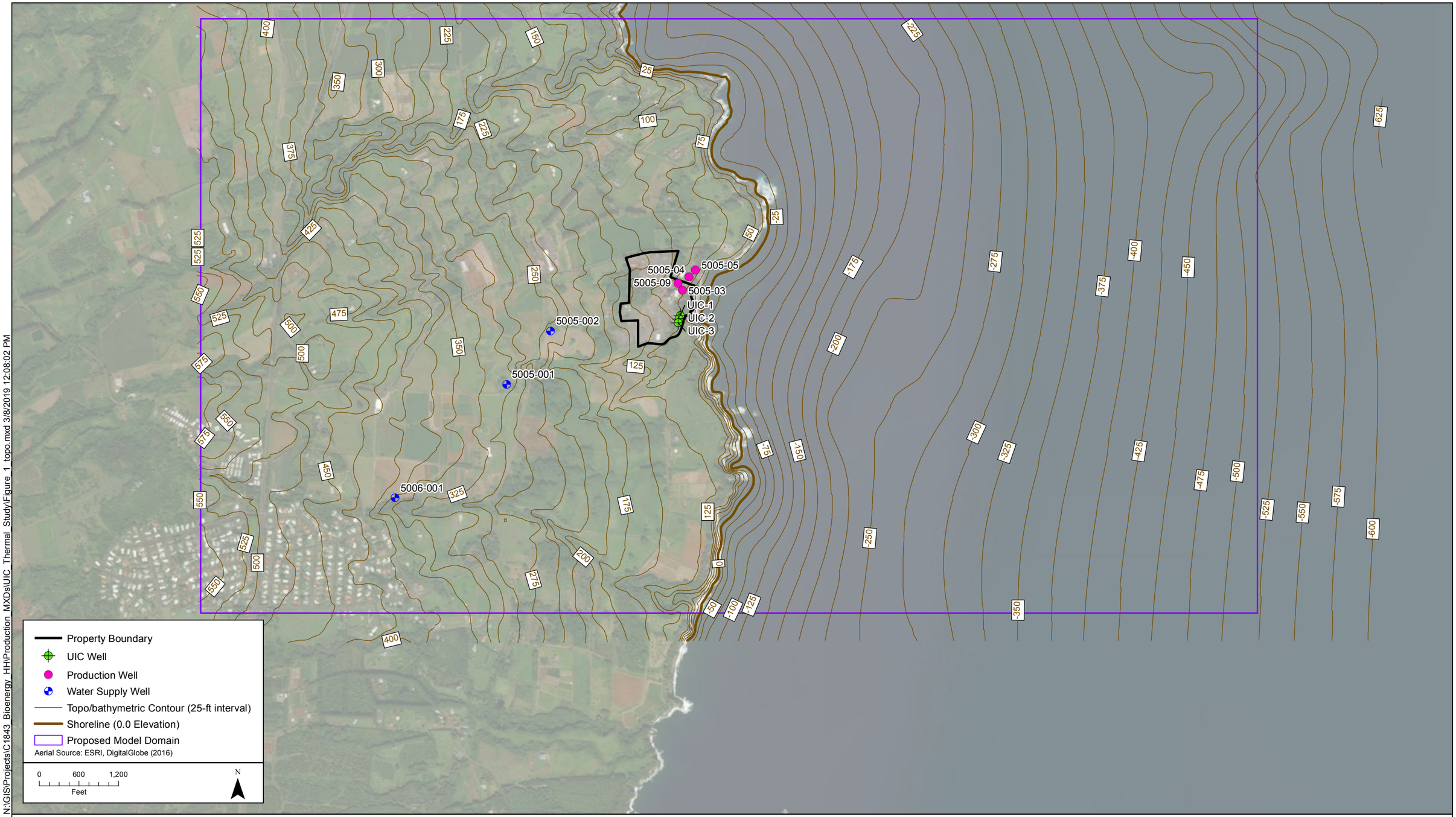
Fee Simple Property

P:\Projects\C493_Pepeekeo_HI\Production_MXDs\UIC_Permitting_Application\Fig1_vicinity_map.mxd 8/8/2012 1:33:25 PM

integral consulting inc. ACSI

Figure 1.
Vicinity Map
Hu Honua Bioenergy
Pepeekeo, Hawaii


Supply Well 3 (8-5005-05)
19° 50' 39.5" N
155° 05" 05.4" W
Supply Well 2 (8-5005-04)
19° 50' 38.7" N
-155° 05" 05.9" W
Supply Well 4 (8-5005-09)
19° 50' 37.8" N
-155° 05" 07.9" W
Supply Well 1 (8-5005-03)
19° 50' 36.8" N
-155° 05" 06.7" W
~ 370 ft
UIC 1
19° 50' 33.22" N (19.84256)
-155° 5' 7.40" W (-155.08539)
UIC 2
19° 50' 32.68" N (19.8424119)
-155° 5' 7.59" W (-155.08544362)
UIC 3
19° 50' 32.12" N (19.84225579)
-155° 5' 7.75" W (-155.0858802)
Old Mamalahoa Hwy
© SPOT IMAGE
© 2018 Europa Technologies
© 2018 Google

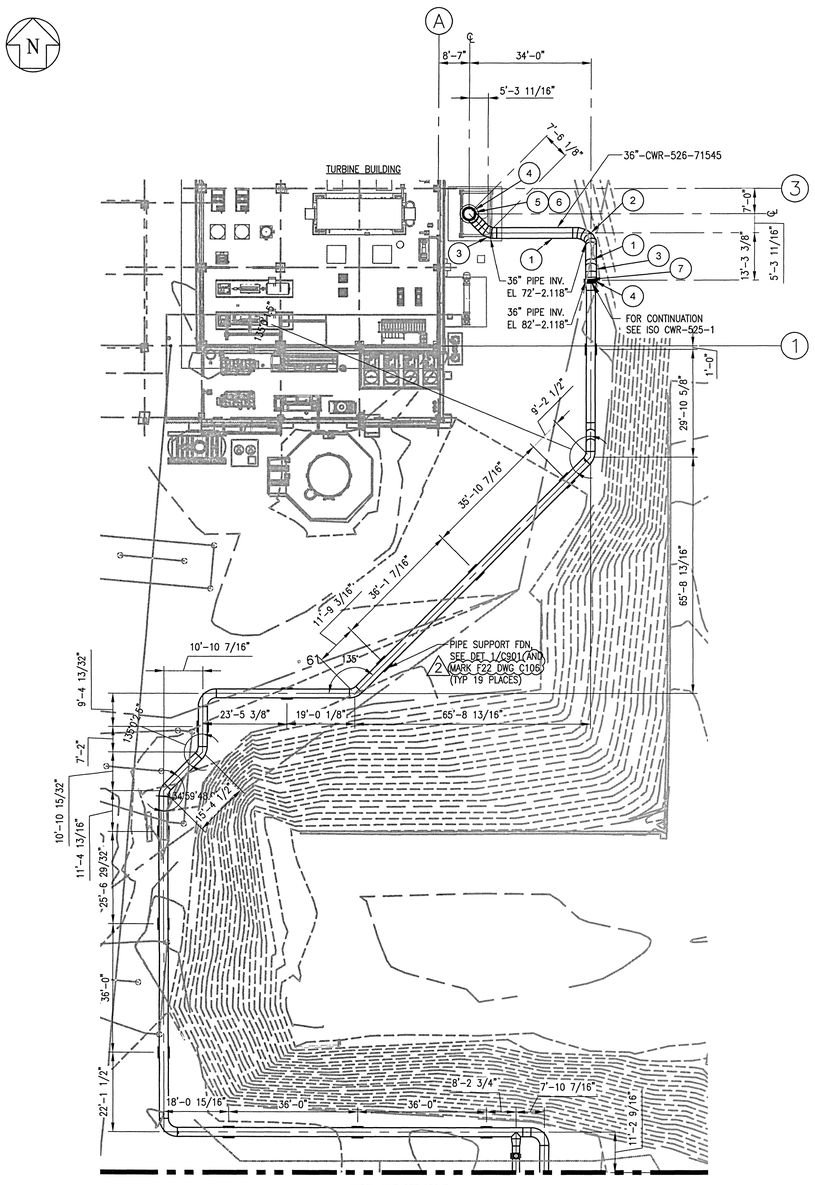


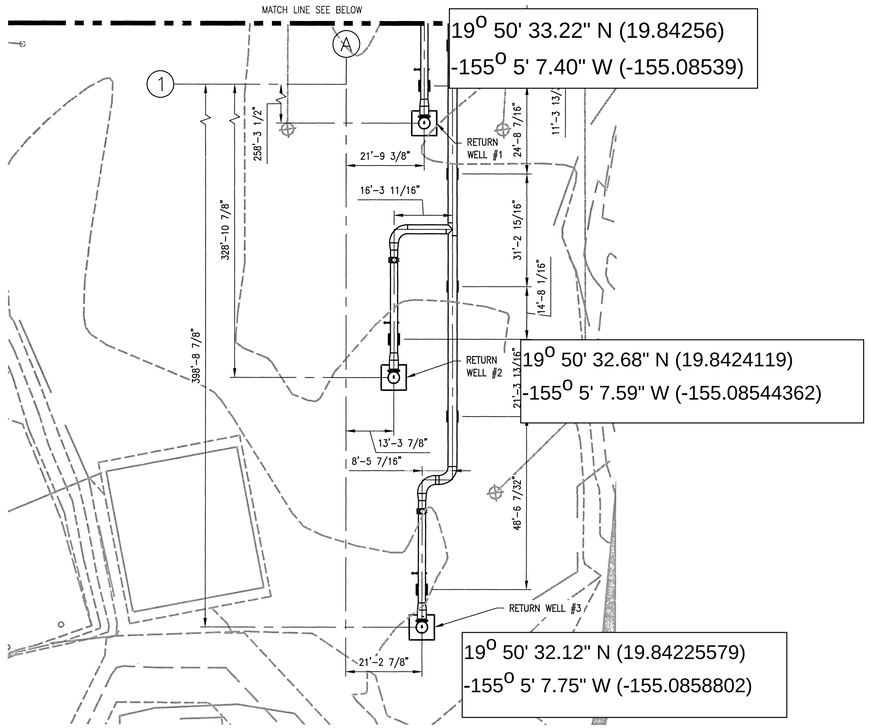
N:\GIS\Projects\C1843_Bioenergy_HH\Production_MXDs\UIC_Thermal_Study\Figure_1_topo.mxd 3/8/2019 12:08:02 PM

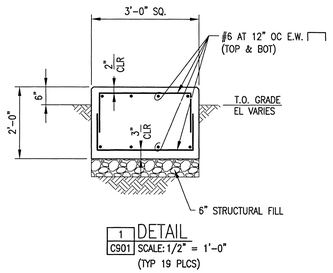
integral consulting inc.

DRAFT

Figure 1.
Topography and Bathymetry
Hu Honua Bioenergy
Pepeekeo, Hawaii







1 DETAIL
C901 SCALE: 1/2" = 1'-0"
(TYP 19 PLCS)

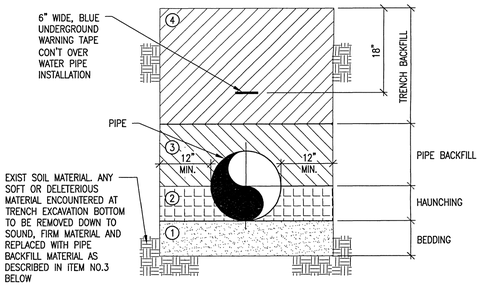
UNDERGROUND COOLING WATER RETURN PLAN

SCALE: 1" = 20'-0"

NOTES:

1. CONTRACTOR TO VERIFY ALL EXISTING ELEVATIONS, GRADES, LOCATIONS, ETC. OF EXISTING FOUNDATIONS, STRUCTURES, UTILITIES, ETC. THAT ARE TO BE MODIFIED, TIED INTO, DEMOLISHED, ETC. PRIOR TO BEGINNING WORK. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND EXISTING CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ESI FIELD REPRESENTATIVE BY THE CONTRACTOR BEFORE WORK CAN CONTINUE.
2. THE PIPING SUBCONTRACTOR IS RESPONSIBLE FOR ALL MISC. PLUGS, ETC. NOT PROVIDED BY VESSEL/PUMP MANUFACTURER.

BILL OF MATERIALS			
ID	QTY	ND	DESCRIPTION
1	30'-0 15/16"	36"	PIPE, HDPE, DR 17, IPS
2	2	36"	ELL 90, 5-SEGMENT, HDPE, PE, IPS DR 17, FABRICATED, ISCO
3	2	36"	ELL 45, 3-SEGMENT, HDPE, PE, IPS DR 17, FABRICATED, ISCO
4	2	36"	BACK UP RING, SS, FF
5	32	1 1/2"x8 1/2"	STUDS, 150 LB FF, SERIES A
6	1	36"	GASKET, 150 LB FF X 1/8" THK, STYLE 9518
7	2	36"	FLANGE ADAPTER, HDPE, DR 17, IPS



EXCAVATION, BACKFILL AND PIPE EMBEDMENT DETAIL

SCALE: NTS

NOTE: WATER PIPES SHALL HAVE A MINIMUM COVER OF 4'-0". CONTRACTOR TO PLACE WATER PIPES UNDER OTHER UTILITIES IF A CONFLICT EXISTS. WATER PIPES UNDER SANITARY SEWER PIPES SHALL BE ENCASED WITHIN TEN (10'-0") FEET EITHER SIDE OF SANITARY SEWER PIPES.

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2. HAUNCHING MATERIAL TO BE SAND AND COMPACTED TO 90% OF STANDARD PROCTOR DENSITY PER ASTM D698.
3. PIPE BACKFILL MATERIAL TO BE STONE WITH A MAXIMUM AGGREGATE SIZE OF 3/4", TO A MIN OF 12" THICK ABOVE TOP OF PIPE AND COMPACTED TO 90% OF STANDARD PROCTOR DENSITY PER ASTM D698.
4. TRENCH BACKFILL TO BE MATERIAL REMOVED DURING EXCAVATION OPERATIONS, PLACED IN 8" MAX LIFTS TO GRADE AND EACH LIFT COMPACTED TO 90% OF STANDARD PROCTOR DENSITY PER ASTM D698.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Expiration Date of License: 04/30/2020

Signature

JON J. NIX LICENSED PROFESSIONAL ENGINEER No. 14912-C HAWAII U.S.A.

06.07.18

REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	LLJ/KF	04/20/18	JJN	4/24/18	ISSUED FOR REVIEW
0	BDL	04/25/18	ERS	04/25/18	ISSUED FOR CONSTRUCTION
1	BDL	05/01/18	ERS	05/02/18	REVISED WELL LOCATIONS, ADDED CONCRETE SUPPORTS FOR CWR ABOVE GROUND PIPE
2	HPC	6/4/18	ERS	6/6/18	ISSUED CWR PIPE SUPPORT FDNS FOR PERMIT

REFERENCE DRAWINGS

Drawing File Name
726004C901.dwg

STEAM & POWER ESI SPECIAL FORCES
ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

COOLING WATER RETURN PLAN SECTIONS AND DETAILS

Hu Honua BIOENERGY LLC PEPEEKEO, HI BIOMASS CONVERSION

SCALE: AS NOTED

DRAWING NO.: 726004 C901

REV: 2

DRAWING SCALE BASED ON A REPRODUCTION SIZE OF 24"x36"

T:\HH\726004 - ENG for Biomass Conv\CADD\C900\726004C901.dwg

2/10/04
7/14/04
2/25/05
10/13/05
1/14/06
5/8/06
6/25/07
1/14/08
7/29/09

2 – 8 – 8 3RD. DIST.

TRUE NORTH
Scale: 1in = 400 ft.

Inset
Scale: 1" = 200'

SEA

SOURCE T.M.B., SUB. 7644

SITE LOCATION
COUNTY OF HAWAII

SOUTH HILO, HAWAII

HAWAII BELT ROAD

Dropped Parcels: 1, 5, 12, 13, 14, 16, 22, 23, 24, 25, 26, 28, 32

Owners, lessees, & vendees name recorded on this tax map print may not be current. Please refer to computer and history sheets for current owners.

FOR PROPERTY ASSESSMENT PURPOSES – SUBJECT TO CHANGE

DEPARTMENT OF FINANCE
PROPERTY ASSESSMENT DIVISION
MAPPING BRANCH
STATE OF HAWAII
TAX MAP

COUNTY OF HAWAII		
ZONE	SECTION	PLAT
2	8	08

SCALE: 1 IN = 400 ft.

PRINTED:

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
Is the operator name still okay? Please remember that once a UIC permit is issued and changes to the operator name and facility name occur, you will need to submit a change-of-operator application and a facility-name change application with the related fees in order to revise the permit and to reflect the changes..

Operator

Name of Business Operator:

Hu Honua Bioenergy, LLC

Permanent Address:

28-283 Sugar Mill Road
Pepeekeo, Hawaii 96783

Phone number (e.g., 555-555-5555):

808-964-1101

Fax number (e.g., 555-555-5555):

808-964-5221

Email:

kowen@huhonua.com

Legal Contact

Full Name:

Warren Lee
Title : President

Company:

Hu Honua Bioenergy, LLC

Permanent Address:

28-283 Sugar Mill Road
Pepeekeo, Hawaii 96783

Phone Number (e.g., 555-555-5555):

808-964-1101

Email:

WLee@huhonua.com

Fax Number (e.g., 555-555-5555):

808-964-5221

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
you will need to update the facility name on this form if the facility name had changed.

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **4/23/2018** *(Applicant Action Required)*
the consent completed form from the fee simple land owner is not appropriate for this application. Submission number is different. This consent letter was dated in Y2012 and it is for the old application. We need the current completed form.

Fee Simple Land Owner

Requirements for Fee Simple Land Owner

Provide an original signed and dated written acknowledgement and consent from fee simple owner of the property. Only applicable when the applicant and the land owner are NOT the same entity. This form represents the consent of the fee simple land owner that the applicant and its facility are submitting an Underground Injection Control (UIC) application. This form may be substitued by a written consent from the involved entities, if different wording is preferred. However, be sure to be current, accurate, and clear about the proposed action.

Fee Simple Land Owner Name:

Maukaloa Farms, LLC

Primary Street or Mailing address of the Fee Simple Land Owner

PO Box 1350
Santa Rosa Beach, Florida 32459

Phone number (e.g., 555-555-5555):

808-961-3300

Fax number (e.g., 555-555-5555):

NONE PROVIDED

Email:

hank@hankcorrea.com

Fee Simple Land Owner Written Acknowledgement and Consent - Attachment

Land owner consent HHB UH-3051.pdf - 05/04/2018 09:51 AM

Comment: NONE PROVIDED

Consultant

Full Name of Primary Consultant:

Dennis Poma
Title : President/Owner

Company Name:

Advanced Compliance Solutions, Inc. (ACSI)

Engineer Professional Seal- Attachment

PE License 10776 - Expires 4-30-2020 (4-3-2018).pdf - 07/25/2019 05:52 PM

Comment: NONE PROVIDED

Address

94-515 Ukee St, #301
Waipahu, Hawaii 96797

Phone Number (e.g., 555-555-5555):

808-369-7116

Fax Number (e.g., 555-555-5555):

866-282-6206

Email:

dennis.poma@acsihawaii.com

CONSENT OF THE FEE SIMPLE LAND OWNER FOR AN UNDERGROUND INJECTION CONTROL (UIC) APPLICATION (This form is only applicable when the applicant and the land owner are NOT the same entity.)

This form represents the consent of the fee simple land owner that the applicant and its facility are submitting an Underground Injection Control (UIC) application for: (Check the appropriate proposed action)

- ☒ New injection well construction
- ☐ Permit modification
- ☐ Permit renewal
- ☐ Change-of-Operator
- ☐ Facility-Name-Change
- ☐ Existing Injection Well needing permit registration
- ☐ Abandonment of a Registered Injection Well
- ☐ Abandonment of an Unregistered Injection Well

Facility Name: Hu Honua Bioenergy LLC

UIC Permit No. (if issued): UH-2941

Address: 28-283 Sugar Mill Rd, Pepeekeo HI 96783

TMK No. 2-8-008:104

Applicant: Hu Honua Bioenergy LLC

Fee Simple Land Owner's Name: Maukaloa Farms, LLC

Mailing Address: PO Box 1350, Santa Rosa Beach, FL 32459

Land Owner's Signature: [signature] Date: 4/20/18

Note: The purpose of this form is to show, for the purpose of UIC application processing, that the fee simple land owner is aware and consents to the proposed action of the applicant. This form may be substituted by a written consent from the involved entities, if different wording is preferred. However, be sure to be current, accurate, and clear about the proposed action.

(11/2003)

LICENSE NUMBER	EXPIRATION DATE
PE - 10776	04/30/2020

STATE OF HAWAII DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS

PROFESSIONAL ENGINEER

CLASS(ES): CE

DENNIS S POMA
PO BOX 30094
HONOLULU HI 96820

(SIGNATURE OF LICENSEE) Dennis S Poma

RENEW YOUR LICENSE BY THE LICENSE EXPIRATION DATE. A LICENSEE WHO HAS NOT RENEWED BY THE LICENSE EXPIRATION DATE IS UNLICENSED AND MAY NOT PRACTICE.

TO ENSURE THAT A RENEWAL NOTICE IS SENT TO YOUR MOST CURRENT ADDRESS, IT IS YOUR RESPONSIBILITY TO INFORM US OF ANY ADDRESS CHANGES.

IF YOU DO NOT RECEIVE A RENEWAL NOTICE AT LEAST 6 WEEKS BEFORE THE STATED EXPIRATION DATE, CONTACT:

PVL Licensing Branch
Commerce & Consumer Affairs
P.O. Box 3469
Honolulu, Hawaii 96801-3469
Phone: (808) 586-3000

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
identify all the sources and provide the "volume and percentage" of each source. The assigned % to each source should add-up to 100%. Show flow diagram showing all the sources/wastetream. All wastewater sources must be identified even minute contribution to the wastream.

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
Provide Material Safety Data Sheet (MSDS) for any chemical to be used–chemical additive/ antiscalant.

Injection System

Number of injection wells

3

Source of injected fluid (select all that apply)

Other
Industrial
Other: Non-contact cooling water, water purification impurities, boiler blowdown

Describe in detail the wastestream process and chemical composition of the injectant. If submitting via attachment, please type "See attached."

The attached document "Cooling Water & Industrial Waste Water Process Flow & Chemical Composition" (File: FINAL_Summary WW Process Chemistry_UIC 8-6-19.PDF) is provided describing the waste stream process and chemical composition. Relevant Safety Data Sheets are provided for reference.

Wastestream Process- Attachment

3 D TRASAR 3DT120.pdf - 04/02/2018 09:05 PM

NALCO 352.pdf - 04/02/2018 09:06 PM

NALCO BC2036.pdf - 04/02/2018 09:06 PM

NALCO ELIMIN-OX.pdf - 04/02/2018 09:06 PM

NALCO TRAC108.pdf - 04/02/2018 09:06 PM

NexGuard 22300.pdf - 04/02/2018 09:06 PM

PermaTreat PC-391T.pdf - 04/02/2018 09:06 PM

Boiler_noncontat Chem addatives usage 5-17-18.pdf - 05/17/2018 10:11 AM

FINAL_Summary WW Process Chemistry_UIC 8-6-19.pdf - 08/06/2019 12:50 PM

Comment: NONE PROVIDED

Describe the connection of the wastewater source(s) to the injection well system and the connection between each injection well within the system. If submitting via attachment, please type "See attached."

The attached drawing (File 726004C901 Rev 2 Cooling Water Return Plan Sections and Details (2)-v6(1).PDF) shows the connection between the facility and the UIC wells.

Connection of the Wastewater Source(s)- Attachment

726004C901 Rev 2 Cooling Water Return Plan Sections and Details (2)-v6(1).pdf - 08/06/2019 12:50 PM

Comment: NONE PROVIDED

Rainfall runoff drainage injection wells- Attachment

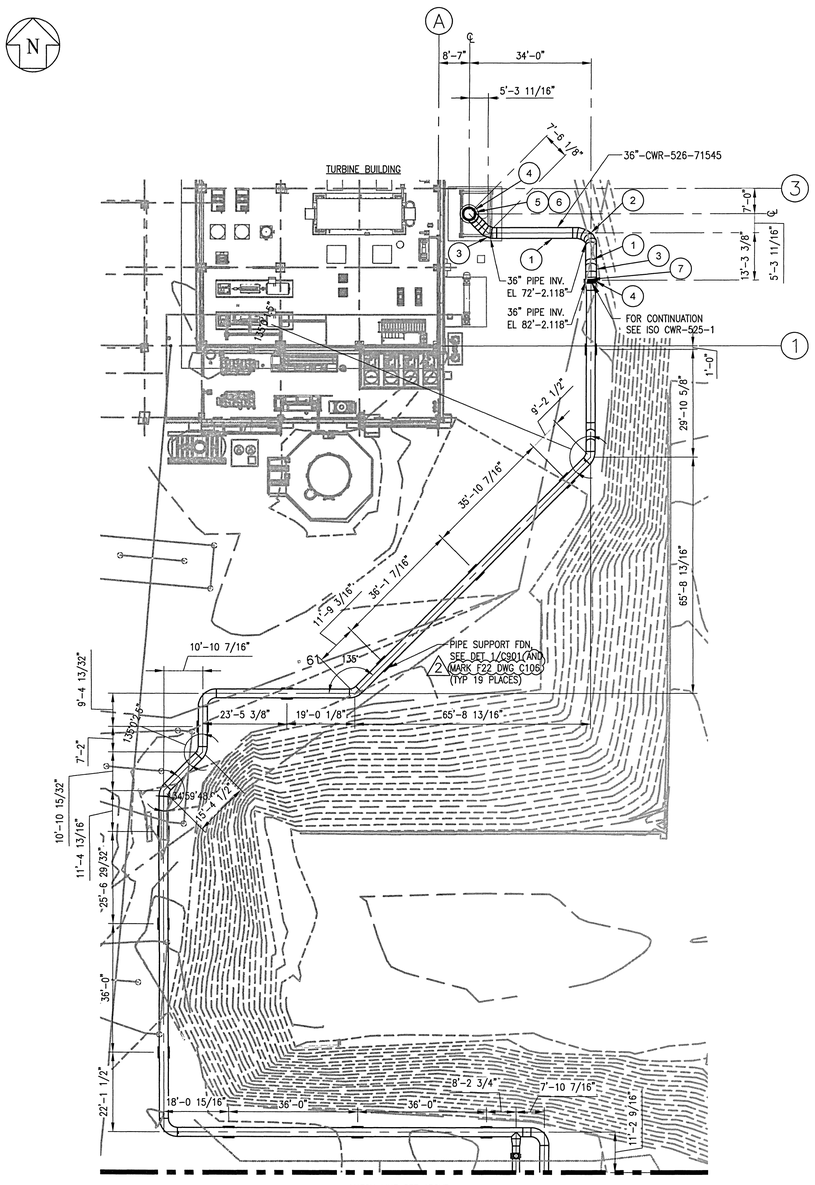
NONE PROVIDED

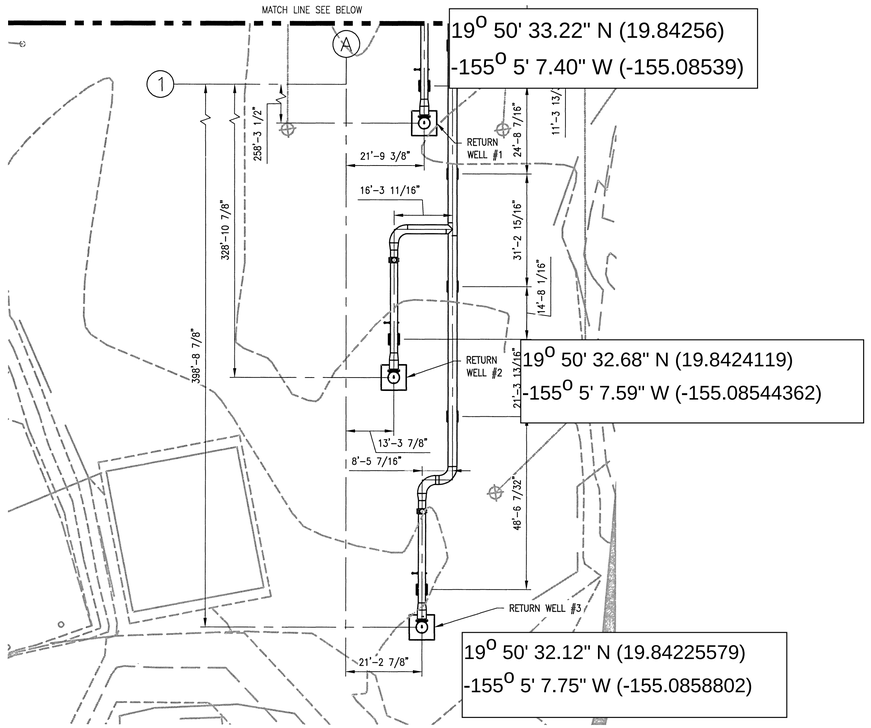
Comment: NONE PROVIDED

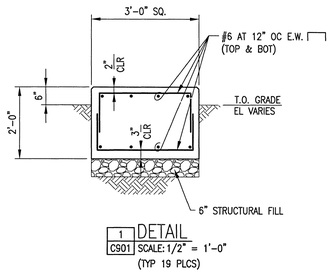
Schematic flow diagrams- Attachment

HHB Water Balance 726004F05 7-30-19.pdf - 08/06/2019 12:49 PM

Comment: Schematic flow diagram attached.







1 DETAIL
C901 SCALE: 1/2" = 1'-0"
(TYP 19 PLCS)

UNDERGROUND COOLING WATER RETURN PLAN

SCALE: 1" = 20'-0"

NOTES:

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BILL OF MATERIALS			
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3	2	36"	ELL 45, 3-SEGMENT, HDPE, PE, IPS DR 17, FABRICATED, ISCO
4	2	36"	BACK UP RING, SS, FF
5	32	1 1/2"x8 1/2"	STUDS, 150 LB FF, SERIES A
6	1	36"	GASKET, 150 LB FF X 1/8" THK, STYLE 9518
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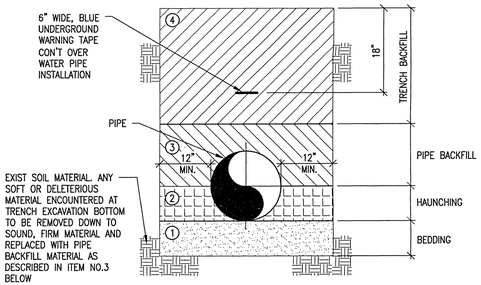

EXCAVATION, BACKFILL AND PIPE EMBEDMENT DETAIL

SCALE: NTS

NOTE: WATER PIPES SHALL HAVE A MINIMUM COVER OF 4'-0". CONTRACTOR TO PLACE WATER PIPES UNDER OTHER UTILITIES IF A CONFLICT EXISTS. WATER PIPES UNDER SANITARY SEWER PIPES SHALL BE ENCASED WITHIN TEN (10'-0") FEET EITHER SIDE OF SANITARY SEWER PIPES.

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4. TRENCH BACKFILL TO BE MATERIAL REMOVED DURING EXCAVATION OPERATIONS, PLACED IN 8" MAX LIFTS TO GRADE AND EACH LIFT COMPACTED TO 90% OF STANDARD PROCTOR DENSITY PER ASTM D698.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Expiration Date of License: 04/30/2020

Signature

JON J. NIX LICENSED PROFESSIONAL ENGINEER No. 14912-C HAWAII U.S.A.

06.07.18

REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	LLJ/KF	04/20/18	JJN	4/24/18	ISSUED FOR REVIEW
0	BDL	04/25/18	ERS	04/25/18	ISSUED FOR CONSTRUCTION
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2	HPC	6/4/18	ERS	6/6/18	ISSUED CWR PIPE SUPPORT FDNS FOR PERMIT

REFERENCE DRAWINGS

Drawing File Name
726004C901.dwg

STEAM & POWER ESI SPECIAL FORCES
ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

COOLING WATER RETURN PLAN SECTIONS AND DETAILS

Hu Honua BIOENERGY LLC PEPEEKEO, HI BIOMASS CONVERSION

SCALE: AS NOTED

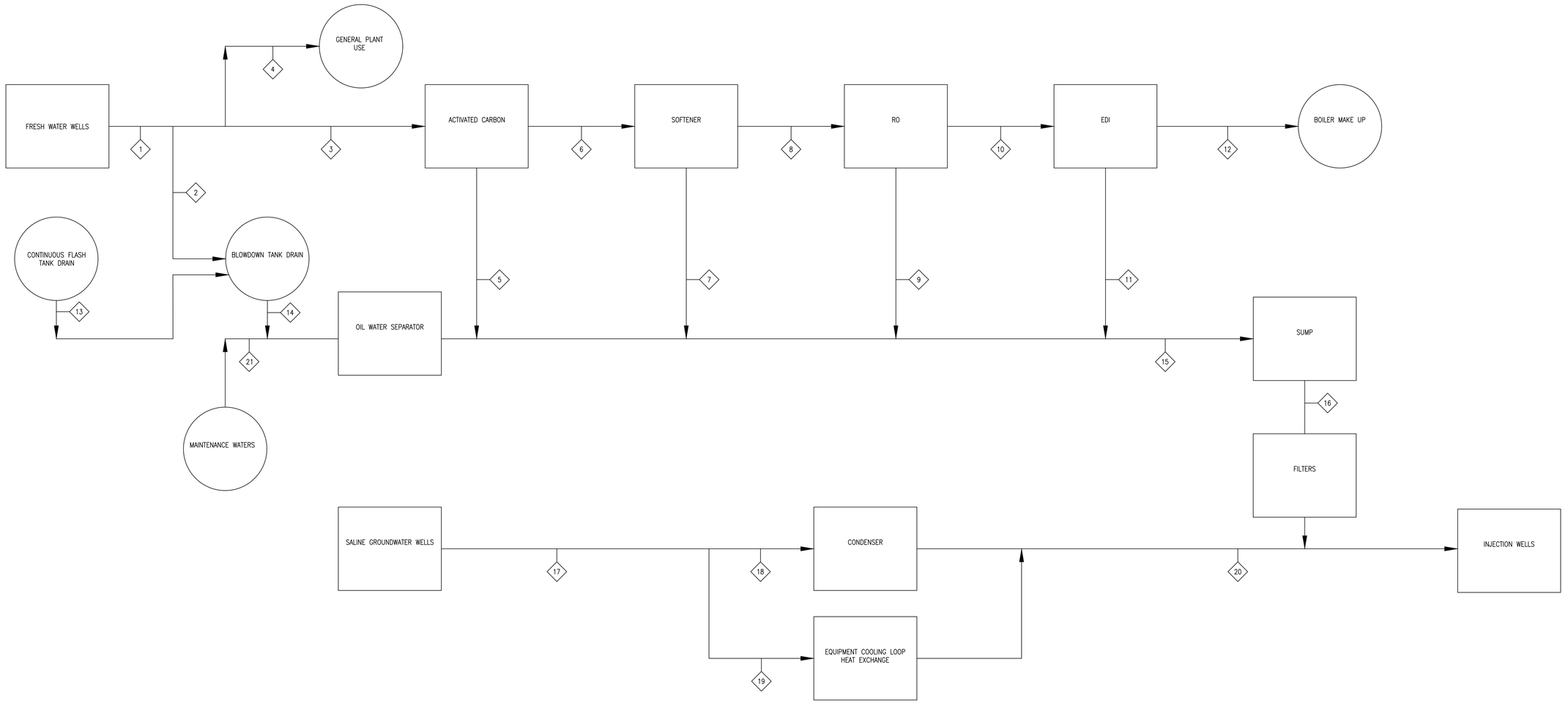
DRAWING NO.: 726004 C901

REV: 2

DRAWING SCALE BASED ON A REPRODUCTION SIZE OF 24"x36"

T:\HH\726004 - ENG for Biomass Conv\CADD\C900\726004C901.dwg

** SAFETY FIRST **



	Point Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Point Name		Fresh water from wells	Blowdown sub cooling	To water treatment system	General Plant Use	Activated Carbon Back Wash	Softener Inlet Flow	Softener Back Wash	RO Feed	RO Reject	RO Permeate	EDI Reject	DI Product	CBT Drain	IBT Drain	Sump Inlet Flow	Sump Outlet Flow	Saline Water Production	Flow to Steam Surface Condenser	Flow to aux equipment cooling heat exchangers	Condenser / Aux cooling combined discharge flow	Maintenance Drains
	Design Water Flow	gpm	371	120	201	50	63	138	34	104	26	78	8	70	6	236	373	746	15,000	13,900	1,100	15,000	40
High Load 25.2 MW Gross 21.5 MW Net	Average Water Flow	gpm	59	2	52	5	0	52	0	52	13	39	4	35	4	6	23	23	15,000	13,900	1,100	15,000	0.3
	Temperature	°F	70	70	70	70	70	70	70	70	70	70	70	70	244	140	82	82	60	60	60	81.2	70
Low Load 13.7 MW Gross 10 MW Net	Average Water Flow	gpm	59	2	52	5	0	52	0	52	13	39	4	35	4	6	23	23	15,000	13,900	1,100	15,000	0.3
	Temperature	°F	70	70	70	70	70	70	70	70	70	70	70	70	244	140	82	82	60	60	60	70.3	70

REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	AMF	10/03/12	TJB	10/04/12	ISSUED FOR REVIEW
0	AMW	04/09/13	TJB	04/09/13	ISSUED FOR PERMIT
1	SAS	05/15/18	CSR	05/15/18	ISSUED WITH UPDATED EQUIPMENT
2	SAS	05/17/18	CSR	05/17/18	ADDED MAINTENANCE WATER AND OIL WATER SEPARATOR
3	KWR	03/19/19	CSR	03/19/19	REMOVED LAB DRAINS TO SUMP
4	AND	07/26/19	CSR	07/26/19	LOWERED GROUNDWATER TEMPERATURE

REFERENCE DRAWINGS

Drawing File Name

NOT FOR CONSTRUCTION

ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

WATER BALANCE PROCESS FLOW DIAGRAM

Hu Honua BIOENERGY LLC PEPEEKEO, HI BIOMASS CONVERSION

SCALE: None

DRAWING NO.: 726004 F05

REV: 4

DRAWING SCALE BASED ON A REPRODUCTION SIZE OF 24"x36"

Cooling Water & Industrial Waste Water Process Flow & Chemical Composition

Underground Injection Control (UIC) Permit No. UH-3051

Prepared for:

Hū Honua BIOENERGY LLC

28-283 Sugar Mill Road
Pepeekeo, Hawaii 96783

Prepared by:

Advanced Compliance Solutions, Inc.
Post Office Box 30094
Honolulu, Hawaii 96820

August 2019 (Rev 5/17/18)(Rev3-11-19)(7/26/19)(8/2/19)

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ATTACHMENT I WATER BALANCE PROCESS FLOW DIAGRAM
ATTACHMENT II STEAM SURFACE CONDENSOR PROCESS FLOW D601
ATTACHMENT III COOLING WATER SYSTEM PROCESS FLOW D706
ATTACHMENT IV EFFLUENT CHARACTERIZATION CHART
ATTACHMENT V WATER DISCHARGE SUMMARY

ACRONYMS AND ABBREVIATIONS

CWRM	Commission on Water Resource Management
EDI	Electrodeionization
F	Fahrenheit
gpd	gallons per day
gpm	gallons per minute
MSDS	Material Safety Data Sheet
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RO	Reverse Osmosis
TMK	Tax Map Key
TSS	total suspended solids
UIC	Underground Injection Control

1 SOURCE WATERS

The Hu Honua Bioenergy ("HHB") facility ("Facility") will be supplied by three water sources; 1) saline water, 2) non-potable freshwater, and 3) potable freshwater. The saline groundwater will be supplied by three (3) existing wells (CWRM Wells No. 8-5005-03, -04 and -05), two of which (-04 and -05) will be deepened to 1200-foot depths and one new well CWRM 8-5005-09 of similar depth (~1200 ft), for use as non-contact cooling water in the condenser and heat exchangers, subject to approval. Non-potable fresh water will be used in steam power generation, maintenance and fire suppression, and will be supplied by two (2), approximately 275 ft. to 300 ft wells situated on TMK 2-8-008:140 (Mauka Well #1, CWRM Well No. 8-5005-01), and TMK 2-8-008:161 (Mauka Well #2, CWRM Well No. 8-5005-07). Potable freshwater will be provided by the County of Hawaii Department of Water Supply.

The primary discharges from the Facility will be once-through non-contact cooling water (up to 21.6 mgd)[1]; reject from the water purification system; discharge from processes associated with power generation, and; discharge generated during daily maintenance operations (up to approximately 34,000 gpd).

2 ONCE-THROUGH NON-CONTACT COOLING WATER

The sole function of saline groundwater from the existing supply wells 5005-03, -04, and -05 and the new supply well -09, is for use as non-contact cooling water in the condenser during power generation. Water from the wells will be comingled after extraction, then routed to two separate areas within the plant as cooling water. The primary use and route is through the surface condenser where turbine steam will be converted back to liquid (90% by volume). The secondary minor route is through two parallel heat exchangers used for cooling of ancillary equipment (10% by volume). See Attachment I, Water Balance Process Flow Diagram F05.

During power generation, three (3) wells will typically be needed for cooling in the condenser. Each supply well pump has a capacity of up to 5,733 gpm; however, each pump will be operated at a reduced capacity of 5,000 gallons per minute (gpm). To meet pressure requirements within the condenser, a continuous 15,000 (gpm) will be required when the plant is producing electricity. This equates to 21.6 million gallons per day and is unchanged from the original application.

The once-through cooling water does not come in direct contact with steam from the turbine exhaust. The steam condenser is supplied by two parallel 24-inch lines (see Attachment II Steam Surface Condenser Process Flow D601) and enters a water box and long cylindrical shell which contains the steam piping from the turbine. The cooling water flows along the shell around the steam piping converting steam to a liquid. The steam liquid is discharged to the hotwell for return to the makeup water system. Cooling water exits the condenser through two parallel 24-inch lines that merge into a single 36-inch line for transmission to the UIC well system for disposal.

[1] *All volumes are based on a 24-hour average discharge: representative over a calendar week unless otherwise noted*

The second cooling water route of significantly less volume is through two heat exchangers which are supplied by parallel 6-inch lines (see Attachment III, Cooling Water Process Flow diagram D706). Again, once through non-contact cooling water is passed through the heat exchanger to cool other treated water streams that go to various plant equipment, before combining with the once through non-contact cooling water from the surface condenser. Treated water is circulated in a closed loop and does not come in contact with the cooling water.

Spent cooling water (injectant) temperature to the UICs will depend on the Facility's dispatch of electricity by the utility pursuant to the Power Purchase Agreement between HHB and the utility. Attachment I, Column 20, of the Water Balance Process Flow Diagram F05, provides the injectant temperatures in degrees Fahrenheit based on the anticipated operating scenario reflecting a high load of 14 hours per day (25.2 MW gross or 21.5 MW net) and a low load of 10 hours per day (13.7 MW gross or 10 MW net) and a supply water temperature of 60^{o} F based on deepened supply wells. A supply water temperature of 60^{o} F would result in a weighted average injectant temperature of 25.2^{o} C (77.3^{o} F), reflecting a temperature difference of 17.3^{o} F. The utility's dispatch will depend on the utility's immediate needs and will vary, but the anticipated operating scenario assumes an extremely high use case scenario in order to assume higher temperatures in the event such occurs. One (1) 36-inch discharge line will transmit spent cooling water to the three UIC wells. Injection will be controlled by isolation valves installed at each wellhead. All injection wells will be designed such that the total discharge flow rate can be monitored. Note that a prior analysis assumed shallower supply wells and a supply water temperature of 70^{o} F (which are both no longer the case) which resulted in a weighted average discharge temperature of 87.3^{o} F, also reflecting a 17.3^{o} F difference.

Saline cooling water supplied by the production supply wells has a high dissolved mineral content (from seawater contribution). Over time, precipitates may form within the supply and discharge lines, and the UIC wells, diminishing flow rates and supply capacity. To minimize precipitation, manganese dispersant may be used as an additive to the non-contact cooling water. The anticipated dosage rate to be achieved during normal operating conditions will be approximately 2 ppm. Tests will be run once the system is on-line to experimentally determine the optimum target concentration. The proposed manganese dispersant is Nalco product number 3DT12 (Safety Data Sheet is provided under separate file).

3 WATER PURIFICATION SYSTEM

For efficient conversion to steam, and to prevent corrosion and scale formation within the boiler and water/steam tubes, impurities must be removed from the water supply. Freshwater will undergo the following treatment steps before being fed to the boiler: Activated Carbon Filtration (intermittent backwash only), Water Softening (intermittent back wash only), Reverse Osmosis (RO, continuous) and Electrodeionization (EDI, continuous). Only the RO and EDI units will have a discharge consisting of a high TDS brine water. Reject water from Water Purification System (i.e., the RO and EDI) will be discharged at an average rate of 17 gpm or up to 24,480 gpd. Reject water will be discharged direct to the collection sump and passed through a 10-micron duplex cartridge filter.

4 STEAM POWER GENERATION

4.1 Boiler Feedwater Amendments

In addition to upstream treatment, chemical additives will be used to further purify the Boiler Feedwater. Liquid amine will be used to control acidity and maintain a neutral pH; an oxygen scavenger and corrosion inhibitor will be used to protect ferrous and non-ferrous metals, and anti-scale polymers will be used to prevent scale buildup. Concentrations of each additive will be adjusted as necessary to maintain target water quality parameters as determined by in-house laboratory analysis. A summary of the types of chemical additives to be used are presented in Attachment IV Effluent Characterization Chart. Safety Data Sheets (SDS) for each proposed additive are included under a separate file.

4.2 Boiler Blowdown

Because the boiler is only 99% efficient, 1% of the Boiler Feedwater will be intermittently discharged from the Blowdown Tank. This effluent stream will contain low levels of calcium phosphate and iron phosphate precipitates resulting from the reaction of water treatment chemicals within the Boiler Feedwater. Boiler Blowdown water will be generated intermittently at an average rate of 6 gpm.

Boiler Blow Down discharge will be treated to remove residual petroleum products and suspended solids. Blow down will be directed to a 3,000-gallon oil-water separator upstream of a collection sump. Suspended solids will be removed by a duplex 10-micron cartridge filter located after the sump. The collection contents are pumped into the cooling-water discharge line and comingled with once-through cooling water.

5 MAINTENANCE WATER

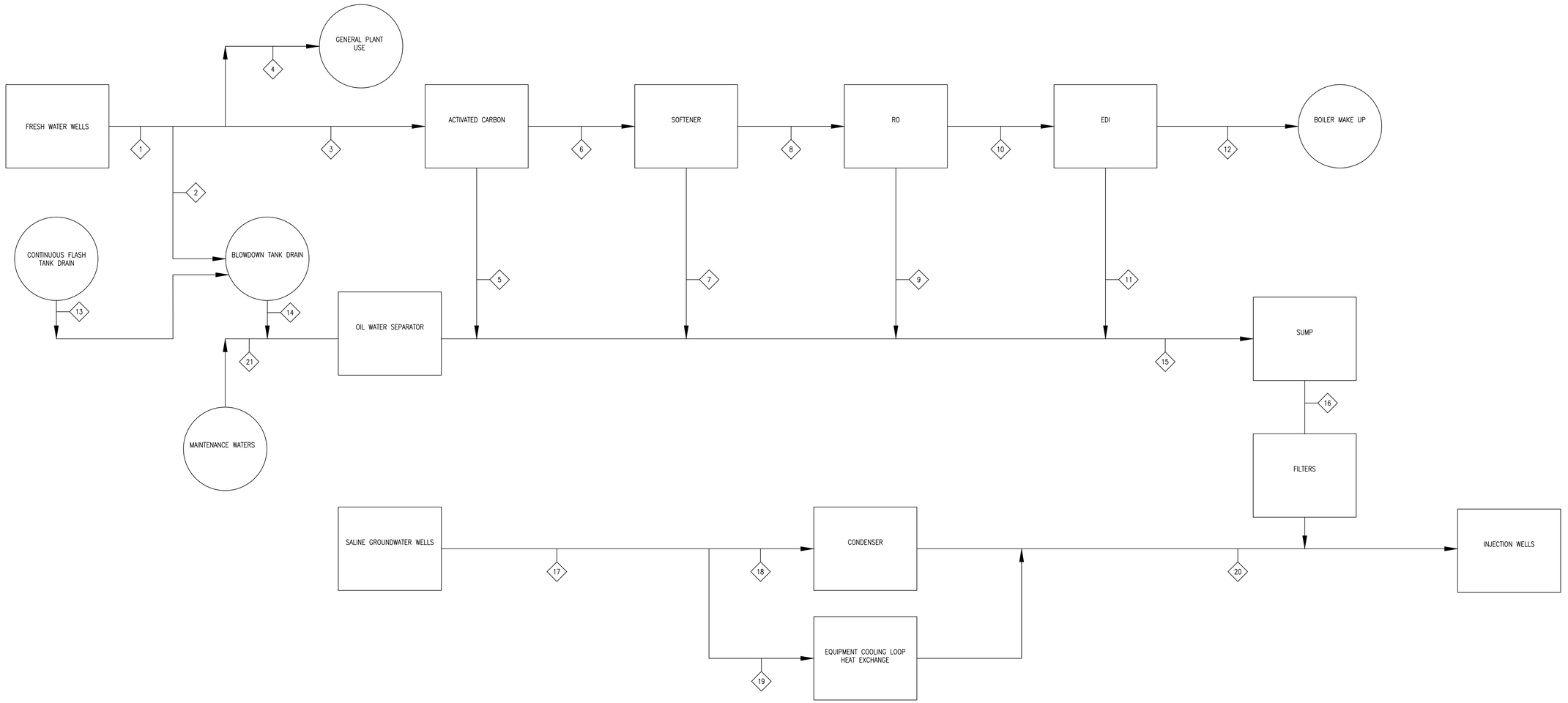
Non-potable fresh water from Mauka Wells #1 and #2 will be used during maintenance operations for cleaning equipment and general housekeeping. Floor drains within the turbine and boiler buildings will be collected and routed to the 3,000-gallon oil-water separator and sump. The discharge volume is expected to be small (<500 gpd) and will be characterized by high TSS from dirt, ash, and other general floor debris. This effluent may also contain residual oil due to incidental drips from equipment lubricants.

6 LAVATORIES

Potable fresh water from the County of Hawaii Department of Water Supply will service lavatories, showers, emergency safety shower, kitchen sink and water fountains. Associated domestic wastewater will be discharged to a separate individual wastewater system (IWS or septic system and on-site disposal system).

A Discharge Summary is provided in Attachment V.

** SAFETY FIRST **



	Point Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Point Name		Fresh water from wells	Blowdown sub cooling	To water treatment system	General Plant Use	Activated Carbon Back Wash	Softener Inlet Flow	Softener Back Wash	RO Feed	RO Reject	RO Permeate	EDI Reject	DI Product	CBT Drain	IBT Drain	Sump Inlet Flow	Sump Outlet Flow	Saline Water Production	Flow to Steam Surface Condenser	Flow to aux equipment cooling heat exchangers	Condenser / Aux cooling combined discharge flow	Maintenance Drains
	Design Water Flow	gpm	371	120	201	50	63	138	34	104	26	78	8	70	6	236	373	746	15,000	13,900	1,100	15,000	40
High Load 25.2 MW Gross 21.5 MW Net	Average Water Flow	gpm	59	2	52	5	0	52	0	52	13	39	4	35	4	6	23	23	15,000	13,900	1,100	15,000	0.3
	Temperature	°F	70	70	70	70	70	70	70	70	70	70	70	70	244	140	82	82	60	60	60	81.2	70
Low Load 13.7 MW Gross 10 MW Net	Average Water Flow	gpm	59	2	52	5	0	52	0	52	13	39	4	35	4	6	23	23	15,000	13,900	1,100	15,000	0.3
	Temperature	°F	70	70	70	70	70	70	70	70	70	70	70	70	244	140	82	82	60	60	60	70.3	70

REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	AMF	10/03/12	TJB	10/04/12	ISSUED FOR REVIEW
0	AMW	04/09/13	TJB	04/09/13	ISSUED FOR PERMIT
1	SAS	05/15/18	CSR	05/15/18	ISSUED WITH UPDATED EQUIPMENT
2	SAS	05/17/18	CSR	05/17/18	ADDED MAINTENANCE WATER AND OIL WATER SEPARATOR
3	KWR	03/19/19	CSR	03/19/19	REMOVED LAB DRAINS TO SUMP
4	AND	07/26/19	CSR	07/26/19	LOWERED GROUNDWATER TEMPERATURE

REFERENCE DRAWINGS

Drawing File Name

NOT FOR CONSTRUCTION

ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

WATER BALANCE PROCESS FLOW DIAGRAM

Hu Honua BIOENERGY LLC PEPEEKEO, HI BIOMASS CONVERSION

SCALE: None

DRAWING NO.: 726004 F05

REV: 4

DRAWING SCALE BASED ON A REPRODUCTION SIZE OF 24"x36"

AY TURBINE EXHAUST STEAM 726004D600 — "-LPS-273-4151

AZ STEAM TO AIR EJECTORS 726004D301 — 1 1/2"-HPS-214-8900

BA FROM TURBINE EXTRACTION 726004D600 — 3/4"-LPS-274-4152

BC FROM MAIN STEAM LINE 726004D600 — 4"-MPCR-322-4300

BD CONDENSATE FROM BFW HEATER 726004D304 — 4"-MPCR-320-4300

BE TURBINE STEAM SEAL REGULATOR 726004D602 — 1/2"-MPCR-323-4300

BF FROM TURBINE & GLAND SEAL DRAIN 726004D600 — 3/4"-LPS-272-4152

BG FROM TURBINE INLET (TRIP) VALVE 726004D600 — 1"-LPS-275-4152

BH TURBINE STEAM SEAL REGULATOR 726004D602 — 6"-MPS-239-4300

BI TURBINE WATER INDUCTION PREVENT 726004D600 — 1 1/2"-HPCR-303-4152

BJ FROM COOLING WELL 726004D603 — 30"-CWS-407-71545

BK MAKE UP FROM DEAERATOR 726004D304 — 8"-LPCR-342-4152

BL FROM CBD FLASH TANK 726004D303 — 3/4"-LPCR-340-4152

BM FROM GLAND SEAL VACUUM PUMP 726004D602 — 2"-LPCR-346-4152

BN FROM SPRAY CHAMBER 726004D602 — 2 1/2"-LPCR-345-4152

30"-CWR-500-4153 — BU TO RETURN WELL 726004D603

30"-CWR-501-4153

1 1/2"-MPS-251-4300

2"-V-916-4151

SURFACE CONDENSER OUTLET EJ-1 630-636-200-002

SURFACE CONDENSER OUTLET EJ-2 630-636-200-003

24"-CWR-500-4153

24"-CWR-501-4153

TURBINE EXHAUST EJ 630-636-200-001

6"-V-917-4152-

6"-V-918-4152-

SURFACE CONDENSER 820-822-100-001

3"-MPCR-325-4300

2" PIPE STAND

EXISTING HOTWELL

SURFACE CONDENSER INLET EJ-1 630-636-200-006

SURFACE CONDENSER INLET EJ-2 630-636-200-007

24"-CWS-408-71545

24"-CWS-409-71545

NORMAL WATER LEVEL

2"-D-822-4152

12"X10"

3"-LPCR-344-4152

TO LEVEL VALVES

FROM LEVEL CONTROLLER

6"-LPCR-344-4152

HOTWELL WATER PUMP #1 EJ 630-636-200-004

HOTWELL WATER PUMP #1 630-636-200-016

HOTWELL WATER PUMP #2 EJ 630-636-200-005

HOTWELL WATER PUMP #2 360-363-200-018

8"-LPCR-348-4152

8"-LPCR-347-4152

6"-LPCR-350-4152

6"-LPCR-349-4152

1/2"GV38041

SILENCER

HOGGING EJECTOR

DRAIN

6"-V-928-4152-

6"-V-929-4152-

6"-V-917-4152-

4"-V-919-4151-

2 1/2"-V-920-4151-

AIR LEAKAGE METER

INTERCONDENSER

AFTERCONDENSER

INLINE CONDENSER 820-822-100-002

1"-LPCR-351-4152 — BS TO SPRAY CHAMBER 726004D602

1/2"-LPCR-352-4152 — DI TO SAMPLE STATION 726004D803

1/2"-LPCR-343-4152 — AW TO TURBINE EXHAUST 726004D600

6"-LPCR-341-4152 — P TO DEAERATOR 726004D304

REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	ALW	05/09/12			

REFERENCE DRAWINGS

Drawing File Name
726004D601.dwg

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ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

STEAM SURFACE CONDENSER & CONDENSATE PUMPS

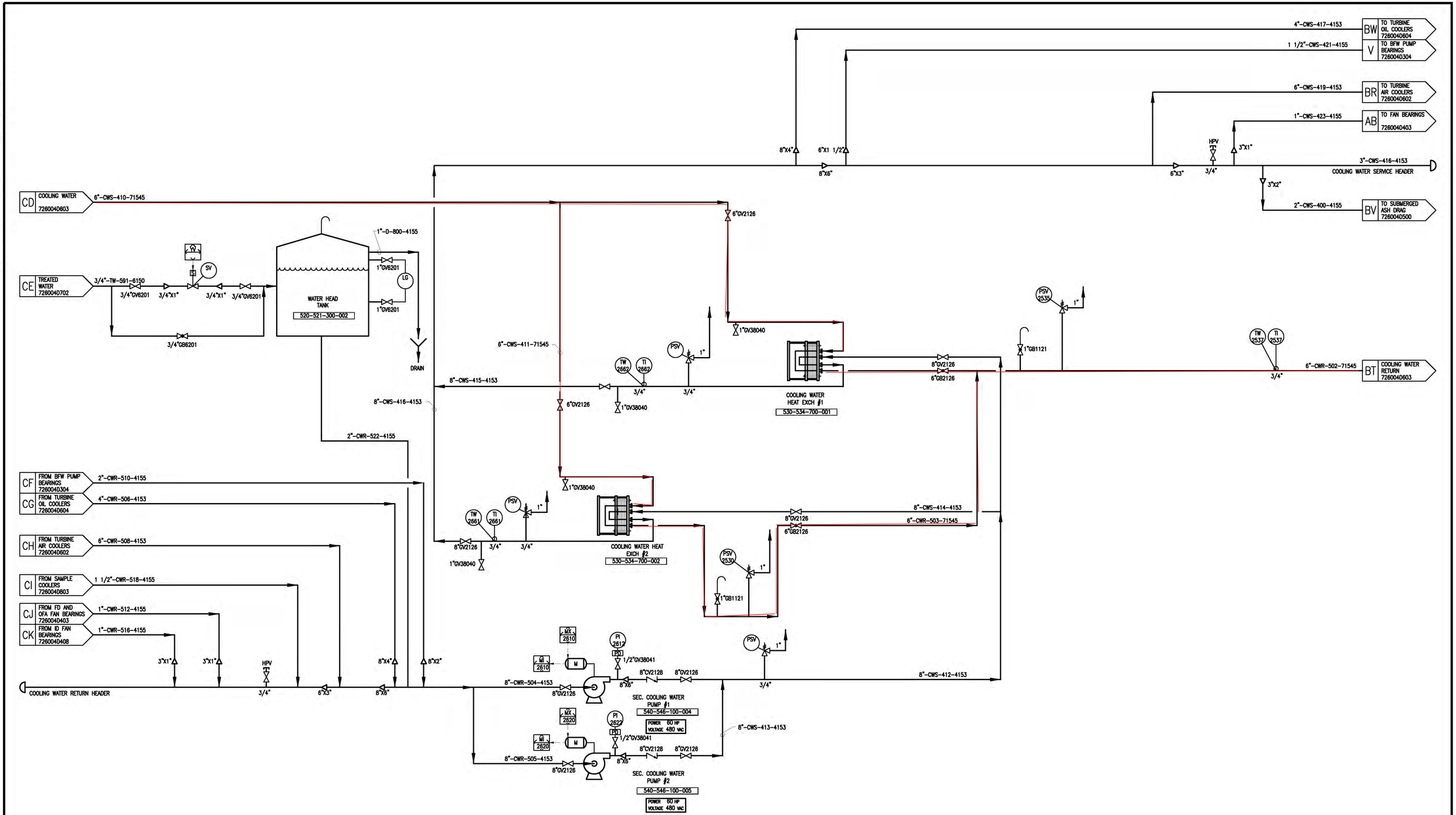
Hū Honua BIOENERGY LLC — PEPEEKEO, HI BIOMASS CONVERSION

SCALE: None

DRAWING NO.: 726004 D 01

REV: A

Plotted by Watkins, Laurie on Wednesday, August 01, 2012 5:52:36 PM



REV	DRAWN	DATE	CHK'D	DATE	DESCRIPTION
A	ALW	05/11/12			

REFERENCE DRAWINGS

Drawing File Name
726004D706.dwg

NOT FOR CONSTRUCTION

ESI Inc. of Tennessee
1250 Roberts Blvd.
Kennesaw, GA 30144
(770)427-6200
esitenn.com

COOLING WATER SYSTEM

Hū Honua BIOENERGY LLC PEPEEKEO, HI BIOMASS CONVERSION

SCALE: None

DRAWING NO.: 726004 D70 □ REV: A

ATTACHMENT IV - HHB- Effluent Characterization Chart

Process ID	Effluent Origin	Effluent Description	Effluent Characteristic	Discharge Type	Frequency	Estimated Concentration
Water Purification System						
	Activated Charcoal	Backwash	High TSS	Intermittent	every 7 days	depends on Freshwater well
	Softening System	Backwash	High Total Dissolved Solids (TDS)	Intermittent	every 4 days	1.0 to 2.0 g/L NaCL + CaCl2
	Reverse Osmosis System	Brine	High TDS	Continuous	Continuous	500-700 ppm
	Electrodeionization System	Brine	High TDS	Continuous	Continuous	<25ppm
Boiler Water Treatment Chemicals						
	Amine	Chemical Additive	Residual, breaks down inside boiler to ammonia	Continuous	See blowdown	<5ppm Ammonia
	Oxygen Scavenger	Chemical Additive	Residual, breaks down inside boiler to CO2, H2O and N2	Vented	NA	NA
	Anti-Scale	Polymers	Trace, breaks down inside boiler to CO2 andH2O	Continuous	See blowdown	See blowdown
	Anti-Scale	Tri-Sodium Phosphate/Di-Sodium Phosphate	Forms precipitate with Iron and Calcium	See Intermittent Blowdown	See Intermittent Blowdown	See Intermittent Blowdown
Boiler Water & Main Steam						
	Intermittent Blow Down	Off-spec Boiler Water	High TDS, Low TSS calcium phosphate and iron phosphate complexes, Trace ammonia	Intermittent	1 to 3 times per day	TDS<250ppm
Maintenance Operations						
	Bottom and Fly Ash	Wash Water	High TSS	Intermittent	twice a day	NA
	Housekeeping	Floor washwater	Oily water, detergent, TSS	Intermittent	weekly	residual

Hu Honua Bioenergy, LLC

UH-3051 UIC Application

SUBJECT: Boiler Water and Non-Contact Cooling Water Chemical Additive Quantities

Boiler Water Treatment Chemicals

Amine (Nalco 352)	13.2 lbs/day or 1.54 gpd
Oxygen Scavenger (Eliminox)	6.6 lbs/day or 0.77 gpd
Anti-Scale Polymer (Next-Guard)	6.6 lbs/day or 0.73 gpd
Anti-Scale phosphate/polymer (Nalco BC2036)	13.2 lbs/day or 1.34 gpd

Non-Contact Cooling Water

Manganese dispersant (Nalco 3DT120)	2 gallons per 1 million gallons water (43 gpd) as necessary

July 2019

ATTACHMENT V
Hu Honua UIC UH-3051
Water Discharge Summary

References:

a. *Water Balance Process Flow Diagram", F05*
b. *Cooling Water & Industrial Waste Water Process Flow and Chemical Composition*

NON-CONTACT COOLING WATER DISCHARGE (#20) from Saline Water Wells to UIC

Receives Flows from:

- Condenser (#18), 13,930 gpm continuous, (20,044,800 gpd)
- Heat Exchanger (#19), 1080 gpm continuous (1,555,200 gpd)

Effluent Characterization – saline water, high dissolved mineral content, weighted average injectant temperature of 25.2° C (77.3° F).

WASTEWATER SUMP DISCHARGE (#16) to UICs

Sump receives flows from:

- **Reverse Osmosis System brine discharge (#9),** 13 gpm continuous (18,720 gpd), receives flows from Activated Carbon and Softening System
- **Electro-deionization System (#11) (for boiler makeup water),** brine discharge of 4 gpm, continuous, (5,760 gpd), receives flow from RO Permeate
- **Blowdown Tank Discharge (#14)**, 6 gpm, continuous, (8,640 gpd); receives discharges from:
  - Fresh Water Well Sub-cooling blowdown (#2) – 2 gpm, continuous (2,880 gpd)
  - Continuous Flash Tank Drain (#13) – 4 gpm, continuous (5,760)
- **Maintenance Water**, < 500 gpd

Effluent characterization –High TDS, Low TSS calcium phosphate and iron phosphate complexes, trace ammonia

UIC Flow Summary

Waste Stream	Volume (gpd)	Percent
#20 Non-Contact Cooling Water	21,600,00	99.8
#16 Sump Discharge	Up to 34,000	0.2
Total	21,634,000	100%

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
Are the ave. and max. quantities represent as a system flow?

Proposed Injection Quantity (1)

Injection Well Number.

#1

Injection Manner:

Continuous

Average Injection Quantity in gallons per day (gpd): representative average over a calendar week.

7211520

Maximum Injection Quantity in gallons per day (gpd): representative maximum for one day.

10816560

Injection Rate:

Fixed

Average Injection Rate in gallons per minute (gpm): representative average over 24 hours.

5008

Maximum Injection Rate in gallons per minute (gpm): representative maximum for one day.

7512

Average Injection Duration in hours per day: representative average over a calendar week.

24

Maximum Injection Duration in hours per day: representative maximum for one day.

24

Injection Pressure:

Gravity Fed

Wellhead:

Open to atmosphere (vented)

Wellhead terminus elevation in feet above (+) or below (-) ground surface.

83

If pump fed and unvented, average injection pressure in pounds per square inch (psig) at the wellhead: representative average over time of use.

NONE PROVIDED

If pump fed and unvented, maximum injection pressure in pounds per square inch (psig) at the wellhead: representative maximum for one day.

NONE PROVIDED

Proposed Injection Quantity (2)

Injection Well Number.

#2

Injection Manner:

Continuous

Average Injection Quantity in gallons per day (gpd): representative average over a calendar week.

7211520

Maximum Injection Quantity in gallons per day (gpd): representative maximum for one day.

10816560

Injection Rate:

Fixed

Average Injection Rate in gallons per minute (gpm): representative average over 24 hours.

5008

Maximum Injection Rate in gallons per minute (gpm): representative maximum for one day.

7512

Average Injection Duration in hours per day: representative average over a calendar week.

24

Maximum Injection Duration in hours per day: representative maximum for one day.

24

Injection Pressure:

Gravity Fed

Wellhead:

Open to atmosphere (vented)

Wellhead terminus elevation in feet above (+) or below (-) ground surface.

83

If pump fed and unvented, average injection pressure in pounds per square inch (psig) at the wellhead: representative average over time of use.

NONE PROVIDED

If pump fed and unvented, maximum injection pressure in pounds per square inch (psig) at the wellhead: representative maximum for one day.

NONE PROVIDED

Proposed Injection Quantity (3)

Injection Well Number.

#3

Injection Manner:

Continuous

Average Injection Quantity in gallons per day (gpd): representative average over a calendar week.

7211520

Maximum Injection Quantity in gallons per day (gpd): representative maximum for one day.

10816560

Injection Rate:

Fixed

Average Injection Rate in gallons per minute (gpm): representative average over 24 hours.

5008

Maximum Injection Rate in gallons per minute (gpm): representative maximum for one day.

7512

Average Injection Duration in hours per day: representative average over a calendar week.

24

Maximum Injection Duration in hours per day: representative maximum for one day.

24

Injection Pressure:

Gravity Fed

Wellhead:

Open to atmosphere (vented)

Wellhead terminus elevation in feet above (+) or below (-) ground surface.

83

If pump fed and unvented, average injection pressure in pounds per square inch (psig) at the wellhead: representative average over time of use.

NONE PROVIDED

If pump fed and unvented, maximum injection pressure in pounds per square inch (psig) at the wellhead: representative maximum for one day.

NONE PROVIDED

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
Because there are only three (3) proposed injection wells, we prefer that you provide the information by filling out this section instead of providing a table.

PUBLICLY ACCESSIBLE Processing Note
Jaime Rimando on **3/8/2018** *(Applicant Action Required)*
If the proposed depth is say, 500 ft. The surface elevation and the bottom elevation must be equal to 500 ft. All information must be accounted for.

Well Dimensions (1)

Injection well no.

#1

Injection well location:

19.84256,-155.08539
NONE PROVIDED

Diagram For Injection Well Dimensions

Please use the following diagram to answer the questions below. Type N/A if not applicable.

Injection Well diagram

A. Elevations:

A. Ground Surface (ft., msl)

83.0

A. Bottom of Well (ft.,msl)

-717.0

B. Total Depth of Well Below Ground Surface (ft.)

800.0

C. Diameter of Boring (in.)

24.0

D. Well Cellar:

D. Lateral Dimensions

NA

D. Depth (ft.)

NA

D. Material

NA

E. Solid Casing:

E. Diameter (in.)

20.0

E. Stick Up (ft.):

1.0

E. Total Length (ft.)

120.0

E. Material

304 stainless

F. Perforated Casing

F. Diameter (in)

20

F. Perforation (sq. in./ L)

60

F: Stick Up (ft)

None

F. Total Length (ft.)

480

F. Material

304 stainless

G. Open Hole :

G. Diameter (in.)

24.0

G. Total Length (ft.)

200

H. Annular Backfill:

H. Capping

NA

H. Solid Casing

Grout

H. Separation

double cement baskets

H. Perforated Casing

None

H. Open Hole

None

I. Approximate Depth of Groundwater (ft.)

78.0

Optional Table for Multiple Injection Wells

The applicant may enter data in the table instead of single entries for each injection well. If using the table, do not select the "+" icon in the section heading.

Table Data

NONE PROVIDED

Well Dimensions Spreadsheet- Attachment

HHB Well Design Figure 1 and 2.pdf - 07/31/2019 04:48 PM

Comment: NONE PROVIDED

Well Dimensions (2)

Injection well no.

#2

Injection well location:

19.84241119,-155.08544362
NONE PROVIDED

Diagram For Injection Well Dimensions

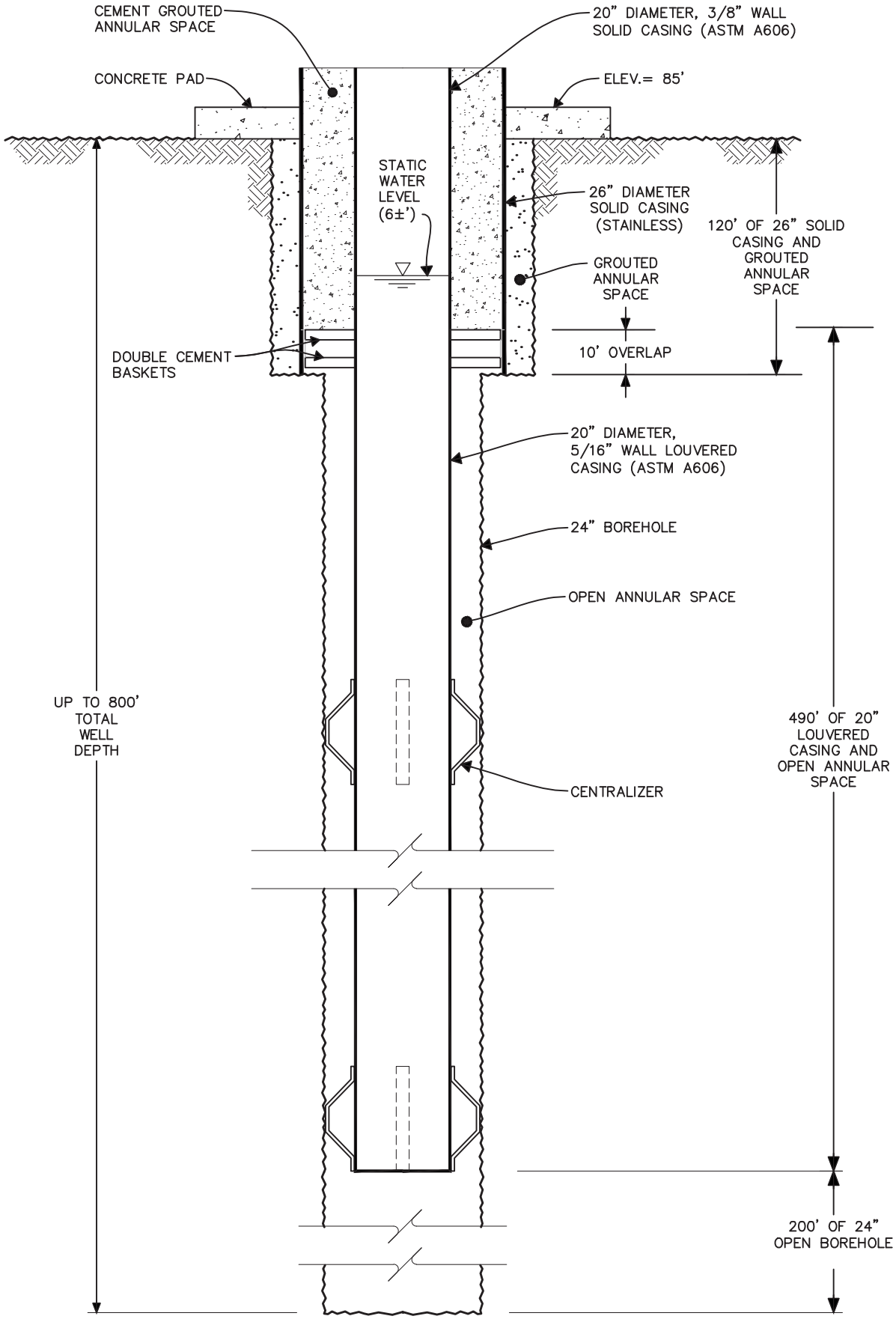


Figure 1

Well Section of Proposed Deepened Disposal Wells

19–01 3–18–19

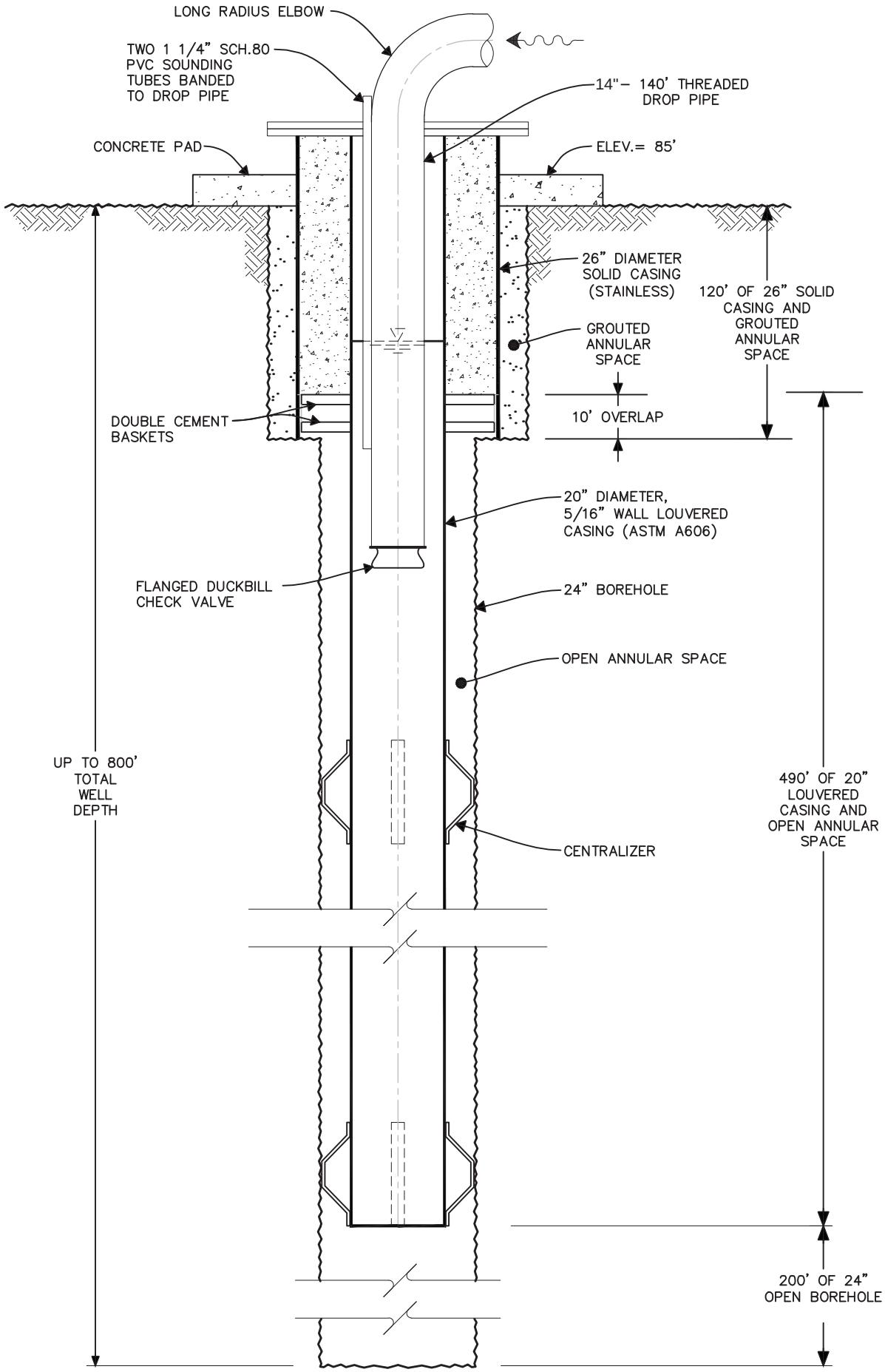


Figure 2

Proposed Drop Pipe for Delivery into the Disposal Wells

19–01 3–18–19

Please use the following diagram to answer the questions below. Type N/A if not applicable.

Injection Well diagram

A. Elevations:

A. Ground Surface (ft., msl)

83.0

A. Bottom of Well (ft.,msl)

-717.0

B. Total Depth of Well Below Ground Surface (ft.)

800.0

C. Diameter of Boring (in.)

24.0

D. Well Cellar:

D. Lateral Dimensions

NA

D. Depth (ft.)

NA

D. Material

NA

E. Solid Casing:

E. Diameter (in.)

20.0

E. Stick Up (ft.):

1.0

E. Total Length (ft.)

120.0

E. Material

304 Stainless

F. Perforated Casing

F. Diameter (in)

20.0

F. Perforation (sq. in./ L)

60

F: Stick Up (ft)

NA

F. Total Length (ft.)

480

F. Material

304 Stainless

G. Open Hole :

G. Diameter (in.)

24.0

G. Total Length (ft.)

200.0

H. Annular Backfill:

H. Capping

NA

H. Solid Casing

Grout

H. Separation

Double Cement Baskets

H. Perforated Casing

None

H. Open Hole

None

I. Approximate Depth of Groundwater (ft.)

78.0

Optional Table for Multiple Injection Wells

The applicant may enter data in the table instead of single entries for each injection well. If using the table, do not select the "+" icon in the section heading.

Table Data

NONE PROVIDED

Well Dimensions Spreadsheet- Attachment

HHB Well Design Figure 1 and 2.pdf - 07/31/2019 04:49 PM

Comment: NONE PROVIDED

Well Dimensions (3)

Injection well no.

#3

Injection well location:

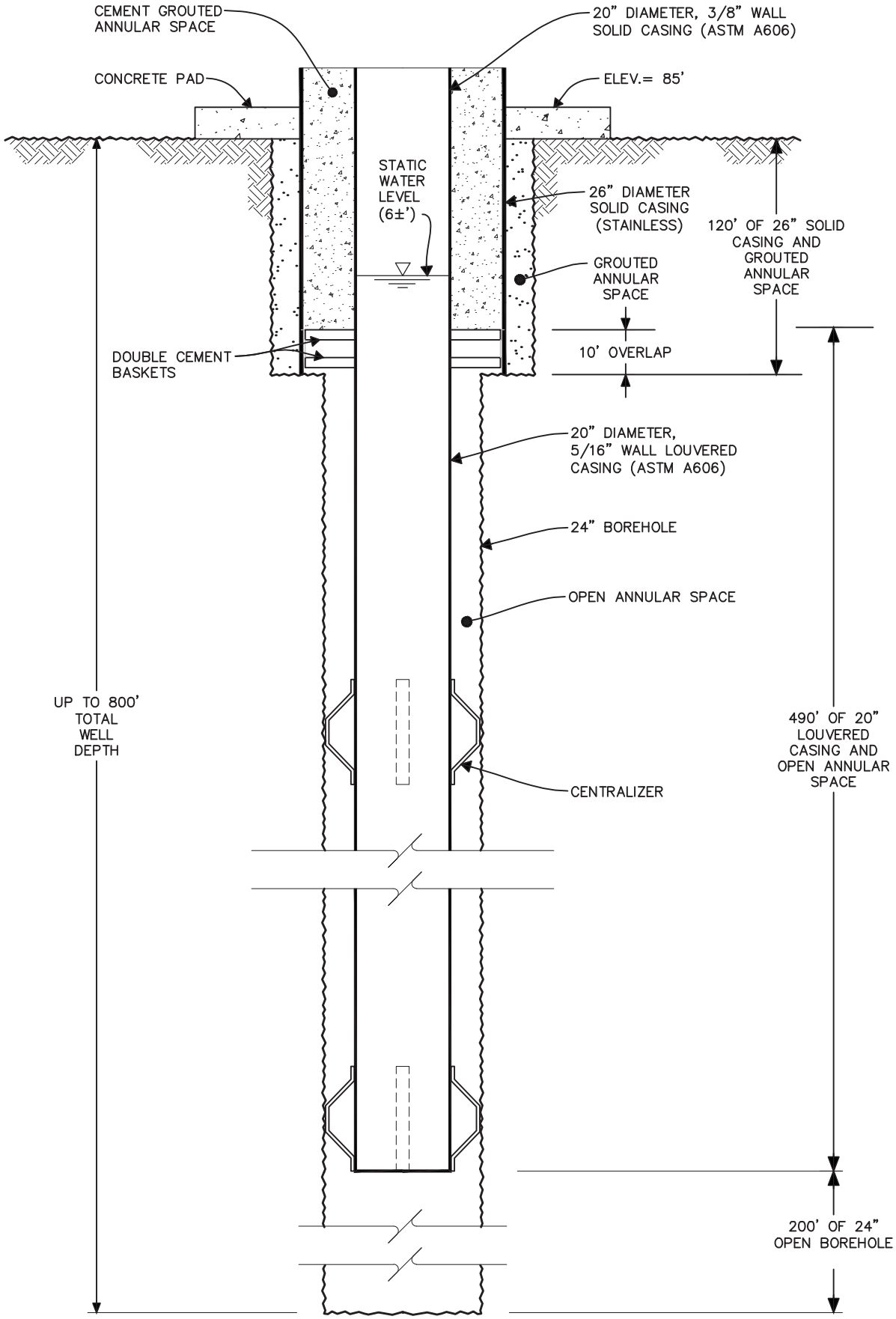


Figure 1

Well Section of Proposed Deepened Disposal Wells

19–01 3–18–19

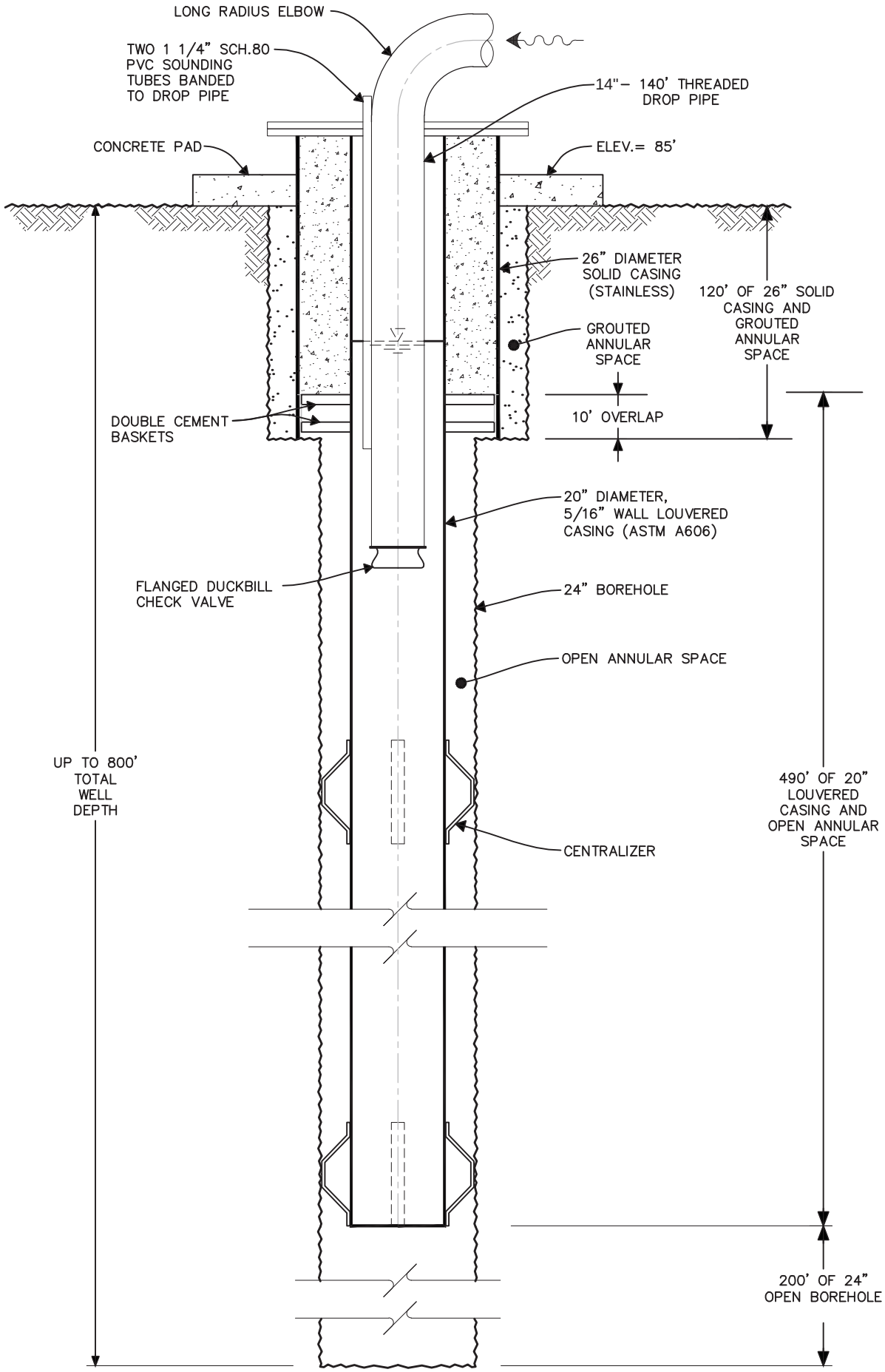


Figure 2

Proposed Drop Pipe for Delivery into the Disposal Wells

19–01 3–18–19

19.84225579,-155.08548802
NONE PROVIDED

Diagram For Injection Well Dimensions

Please use the following diagram to answer the questions below. Type N/A if not applicable.

Injection Well diagram

A. Elevations:

A. Ground Surface (ft., msl)

83.0

A. Bottom of Well (ft.,msl)

-717.0

B. Total Depth of Well Below Ground Surface (ft.)

800.0

C. Diameter of Boring (in.)

24.0

D. Well Cellar:

D. Lateral Dimensions

NA

D. Depth (ft.)

NA

D. Material

NA

E. Solid Casing:

E. Diameter (in.)

20.0

E. Stick Up (ft.):

1.0

E. Total Length (ft.)

120.0

E. Material

304 Stainless

F. Perforated Casing

F. Diameter (in)

20.0

F. Perforation (sq. in./ L)

60

F: Stick Up (ft)

NOne

F. Total Length (ft.)

480

F. Material

304 Stainless

G. Open Hole :

G. Diameter (in.)

24.0

G. Total Length (ft.)

200.0

H. Annular Backfill:

H. Capping

NA

H. Solid Casing

Grout

H. Separation

Double Cement Baskets

H. Perforated Casing

None

H. Open Hole

None

I. Approximate Depth of Groundwater (ft.)

78.0

Optional Table for Multiple Injection Wells

The applicant may enter data in the table instead of single entries for each injection well. If using the table, do not select the "+" icon in the section heading.

Table Data

NONE PROVIDED

Well Dimensions Spreadsheet- Attachment

HHB Well Design Figure 1 and 2.pdf - 07/31/2019 04:49 PM

Comment: NONE PROVIDED

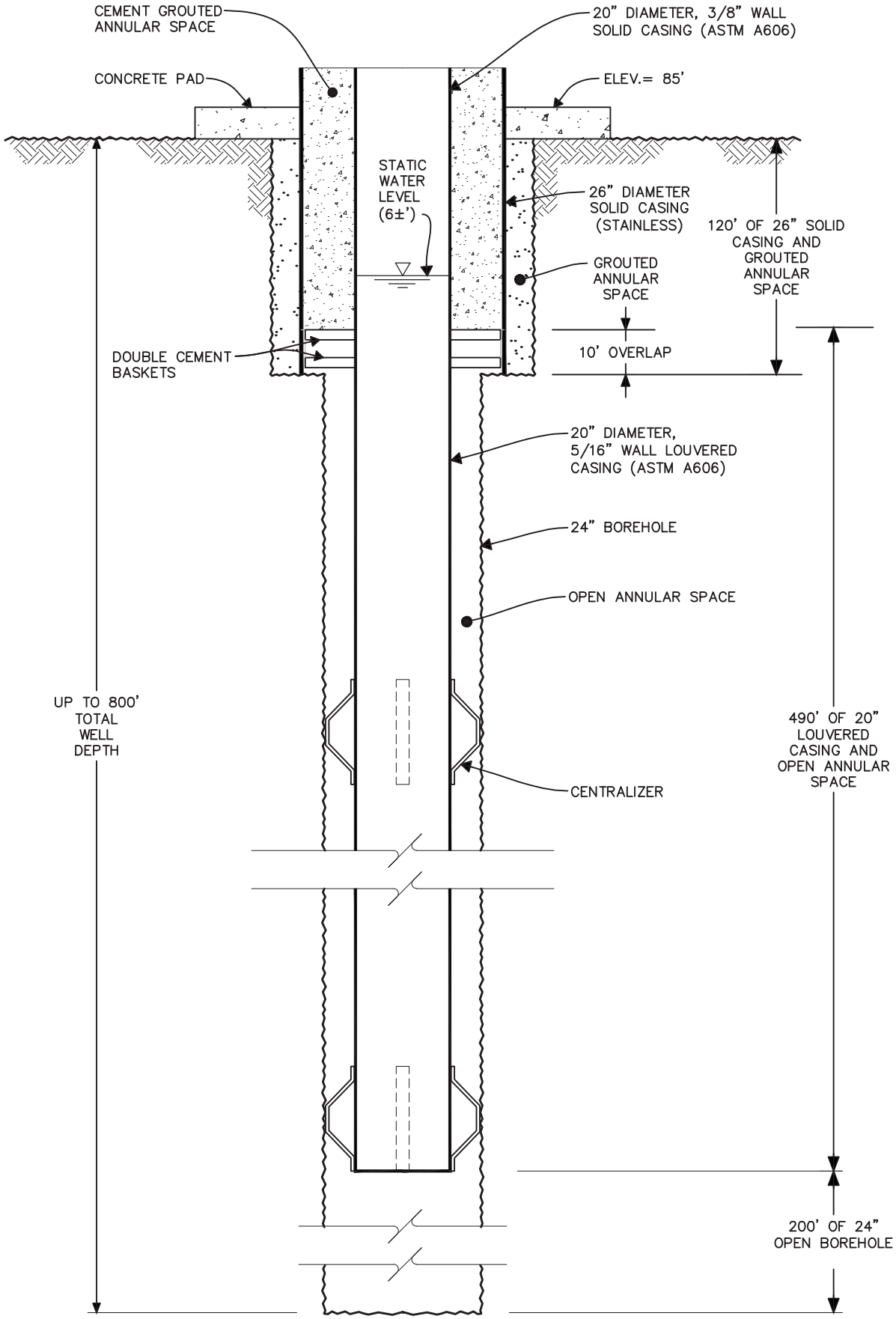


Figure 1

Well Section of Proposed Deepened Disposal Wells

19–01 3–18–19

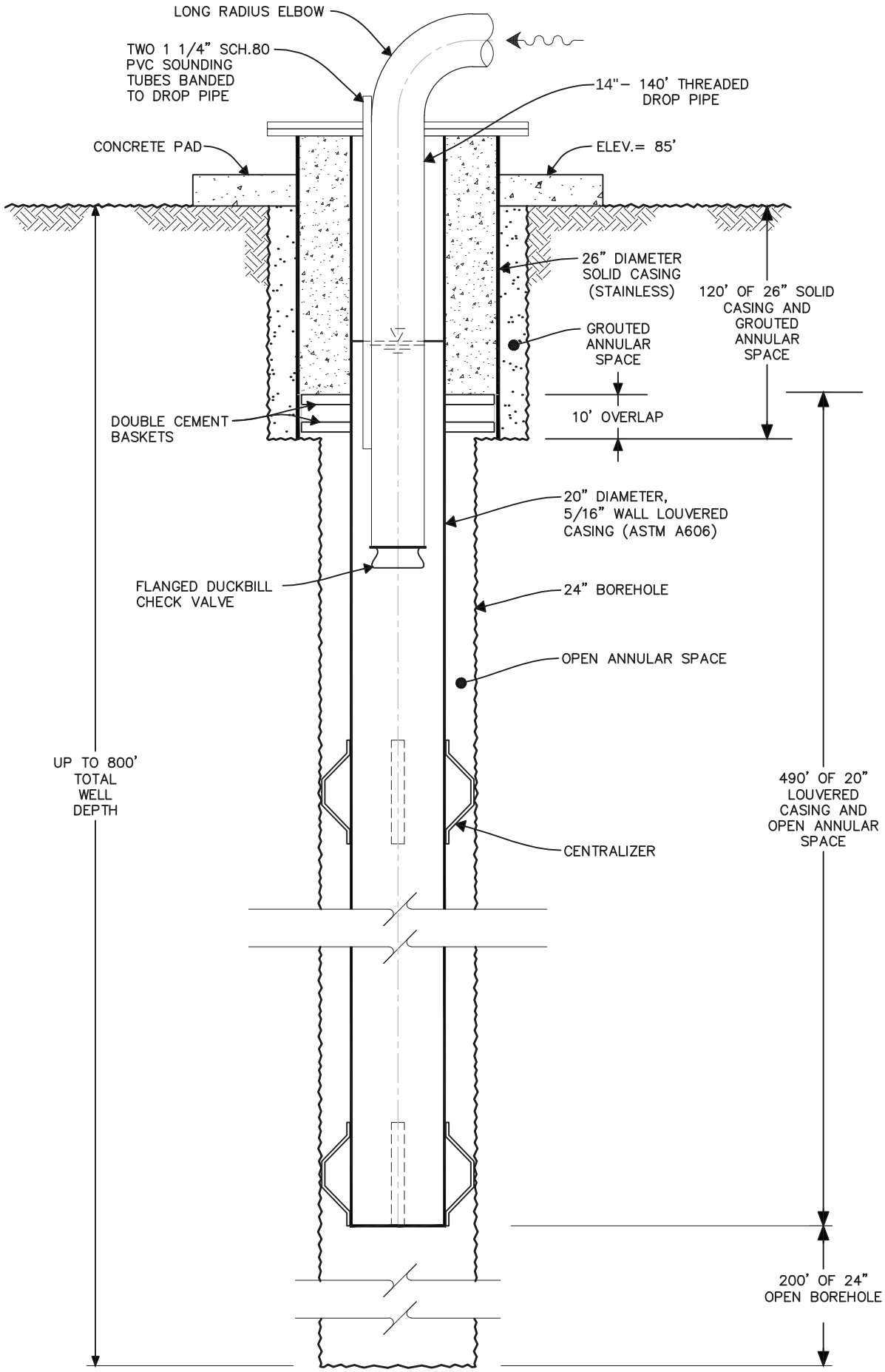


Figure 2

Proposed Drop Pipe for Delivery into the Disposal Wells

19–01 3–18–19

Construction

Drilling Contractor

Water Resources International

Describe the Proposed Injection Well Construction Method:

Rotary drilled

Injection Test

Describe Proposed Injection Test

Each of the three wells will be tested in the same manner. Initially, a step build up test will be run for at least three and possibly more disposal rates. The objective of the step test will be to define the well's maximum capacity with gravity disposal and to select the flowrate at which to run the subsequent 12-hour constant rate test. The goal for each well is to achieve a minimum sustainable disposal capacity of at least 5000 GPM. The desired disposal capacity is 7500 GPM so that the plant can be run at its maximum production rate while one of the three disposal wells is out of service for rehabilitation of its disposal capacity. Otherwise, power plant production would need to be curtailed during well rehabilitation events. The source of water, dependent on the status of well construction, would either be one or more of the supply wells or one of the other disposal wells. In either case, build up in the well being tested would be measured in a pair of sounding tubes, one for manual measurements of build up with an electric sounder and the other to record build up with a data logger. Water level responses in the other disposal wells and in the nearest supply well would also be monitored with downhole data loggers.

Water Quality

Source(s) of nonpotable water serving the facility:

State Well Nos. 5005-003, 004, 005 and 009

Source of potable water serving the facility:

County of Hawaii Board of Water Supply

Available Groundwater Quality (If available):- Attachment

NONE PROVIDED

Comment: NONE PROVIDED

Special Comments or Considerations

Would the injection activity pursuant to this proposed permit application affect any public trust or Native Hawaiian resources or the exercise of traditional cultural practices in the vicinity?

No

If you selected "yes" above, indicate what feasible action can be taken to protect those resources or exercise of practices.

NONE PROVIDED

Please describe any additional information that should be taken into consideration for processing your application.

A memorandum for the Basis of the Request to Deepen the Hu Honua Bioenergy Disposal Wells (July 31, 2019) is attached for reference. A memorandum "Thermal Analysis of Future Cooling Water Discharge Refined Groundwater Modeling" (May 16, 2019) is provided for additional information on the thermal analysis of the planned wells.

And/Or Provide supporting attachment(s).- Attachment

HHB Request to Deepen wells 7-31-19.pdf - 08/06/2019 01:01 PM

20190516 HHB Integral Memo Thermal Study Progress 2019-05-16.pdf - 08/06/2019 01:01 PM

Comment: NONE PROVIDED

Attachments

July 31, 2019

Basis of the Request to Deepen the
Hu Honua Bioenergy, LLC Disposal Wells
UIC Application No. UH-3051

Introduction

Based on the Approval to Construct (ATC) dated June 14, 2018 from the State Department of Health (DOH), Hu Honua Bioenergy, LLC (HHB) began construction of its first of three disposal wells. The ATC allowed the wells to be drilled to 400-foot depth (about 320 feet into groundwater) and limited the method of disposal to the available gravity head, meaning a maximum water level build-up in the well of about 80 feet, the distance from the top of the groundwater to ground level.

After Well No. 1 had been drilled to its permit-approved 400-foot depth, a disposal test was run on February 1, 2019 to determine its capacity with a build-up in the well of no more than 80 feet. That capacity was determined to be 2950 gallons per minute (GPM). The HHB plant requires the combined capacity of its three disposal wells be 15,000 GPM (21.6 MGD). At a minimum, each of the wells would have to have a capacity of at least 5,000 GPM. Capacities of 7,500 GPM would be far more preferable so that the 15,000 GPM plant disposal requirement could be met with two wells while the third was off-line for maintenance and/or rehabilitation. Clearly, far greater capacity than can be provided at 400-foot well depths and gravity delivery is required.

Proposed Well Modifications to Achieve the Required Disposal Capacity

An application to modify the wells to provide the required disposal capacity has been submitted to DOH. The requested well section modifications include the following changes and additions:

- The well depths would be increased from 400 to 800 feet;
- Louvered casing, which was not included in the original well design, would be installed; and
- Water would be delivered into the well with a drop pipe.

Figures 1 and 2 illustrate the revised well sections as proposed. Figure 2A schematically illustrates disposal into the well, down the drop pipe, and into the formation. The increased depth is needed to provide the required capacity. The louvered casing will allow rehabilitation of well disposal capacity by surge blocking as well as by pumping, improving the effectiveness of the rehabilitation. The use of the drop pipe for delivery into the well is to minimize air entrainment which can temporarily reduce disposal capacities dramatically.

Testing Protocol to Potentially Modify the Design of the Disposal Wells

Figure 3 is a temperature and salinity profile through the water column of UIC Well No. 1 at its present 400-foot depth. The groundwater gets colder and more saline with depth. At the proposed 800-foot deepened disposal well depths, it is likely that the groundwater salinity will be comparable to ocean water in the lowest 300 to 350 feet.

As presently proposed and illustrated on Figures 1 and 2, disposal would occur into brackish and saline groundwater. After the disposal wells have been drilled to 800-foot depths and before they have been cased, two disposal tests will be run. The first would have disposal into both brackish and saline groundwater. The second would have disposal limited, using an inflatable packer on the drop pipe, to the zone of saline groundwater in the lower portion of the well. Results would be presented to and discussed with the Department of Health. If it is feasible to limit disposal into the saline zone, the well design illustrated on Figure 1 would be modified to increase the length of 20-inch solid casing (and grouted annulus) and decrease the length of louvered casing by a similar amount to limit disposal into saline groundwater.

Monitoring the Potential Impact on the Department of Water Supply's Kulaimano Well

In letters to DOH, the County Department of Water Supply (DWS) has expressed its concern that the plant's pumping and disposal activities may adversely impact its Kulaimano (Pepeekeo) Well, identified as State No. 5006-001. Monitoring during testing and subsequent operation of the HHB wells will be undertaken to specifically address DWS' concerns. The DWS well is located a little over a mile inland from the HHB wells. There are two wells situated almost midway between the HHB wells and the DWS well. They are identified as Well Nos. 5005-001 and -007 and both are owned by HHB (their locations are shown on Figure 4; note that Well 5005-007 has replaced Well 5005-002 at the same location, as Well 5005-002 has been sealed).

Testing of each of the three disposal wells after deepening to 800-foot depth will be done according to the permit requirements which will include a 12-hour constant rate test at 5000 GPM or possibly greater rate, depending on individual well capacity. The source of water for these disposal tests will be one (or possibly more than one) of the three existing supply wells. At least 24 hours in advance of each of these tests, water level recorders will be installed in both of the intervening HHB wells. The recorders will be retrieved 24 or more hours after the end of each test. The water level records will then be analyzed for any response to the testing activity. Within seven (7) calendar days or less from the end of the test, results of the monitoring will be submitted to DOH-UIC. All results will also be incorporated into the permit-required final report.

These DOH-UIC permit-required tests will be for one disposal well at a time. When the plant is in operation, there will be two or three disposal wells and three of the supply wells operating. Total pumping and disposal will be at 15,000 GPM. Also, the water being disposed will be up to 17°F warmer than produced by the supply wells, allowing temperature as well as water level to be monitored at both intervening HHB wells. Extended monitoring of both water level and temperature in the two HHB intervening wells will be conducted to determine if the supply and disposal activities at the HHB plant will have a detectable impact at either of the two intervening wells. During the plant's first year of operation, reports of this ongoing monitoring would be submitted to DOH-UIC on a monthly basis.

Groundwater Modeling of Potential Thermal Impacts

As described in the May 16, 2019, "Thermal Analysis of Future Cooling Water Discharge, Refined Groundwater Modeling" by Integral Consulting Inc., a groundwater model using the USGS Seawat program has been developed and is currently being refined. This refinement will enable potential impacts on groundwater to be predicted over an area large enough to include DWS' Kulaimano Well and to better predict where in the marine environment the spent cooling water will emerge. Notably, data from the deepened disposal wells, including salinity and temperature profiling, will become available for further refinement of the groundwater model. Based on the data available to date, preliminary model simulations of the 800 feet deep disposal wells indicate that the effect of HHB operations on groundwater will not extend as far inland as the closest of the two HHB intervening wells, much less the DWS well further inland. This is illustrated on Figure 4. The gray area in the plan view at the top of Figure 4 identifies areas inland and offshore of the HHB supply and disposal wells where increases in groundwater temperatures are simulated to be increased by more than 0.5°F. The inland extent does not reach either of the two HHB intervening wells. The lower cross section drawing on Figure 4 is aligned and at the same horizontal scale as the modeled area depicted on the plan view above. These simulation results are to be verified with monitoring of the intervening wells during testing and subsequently after the plant is put into operation as described above.

Attachments

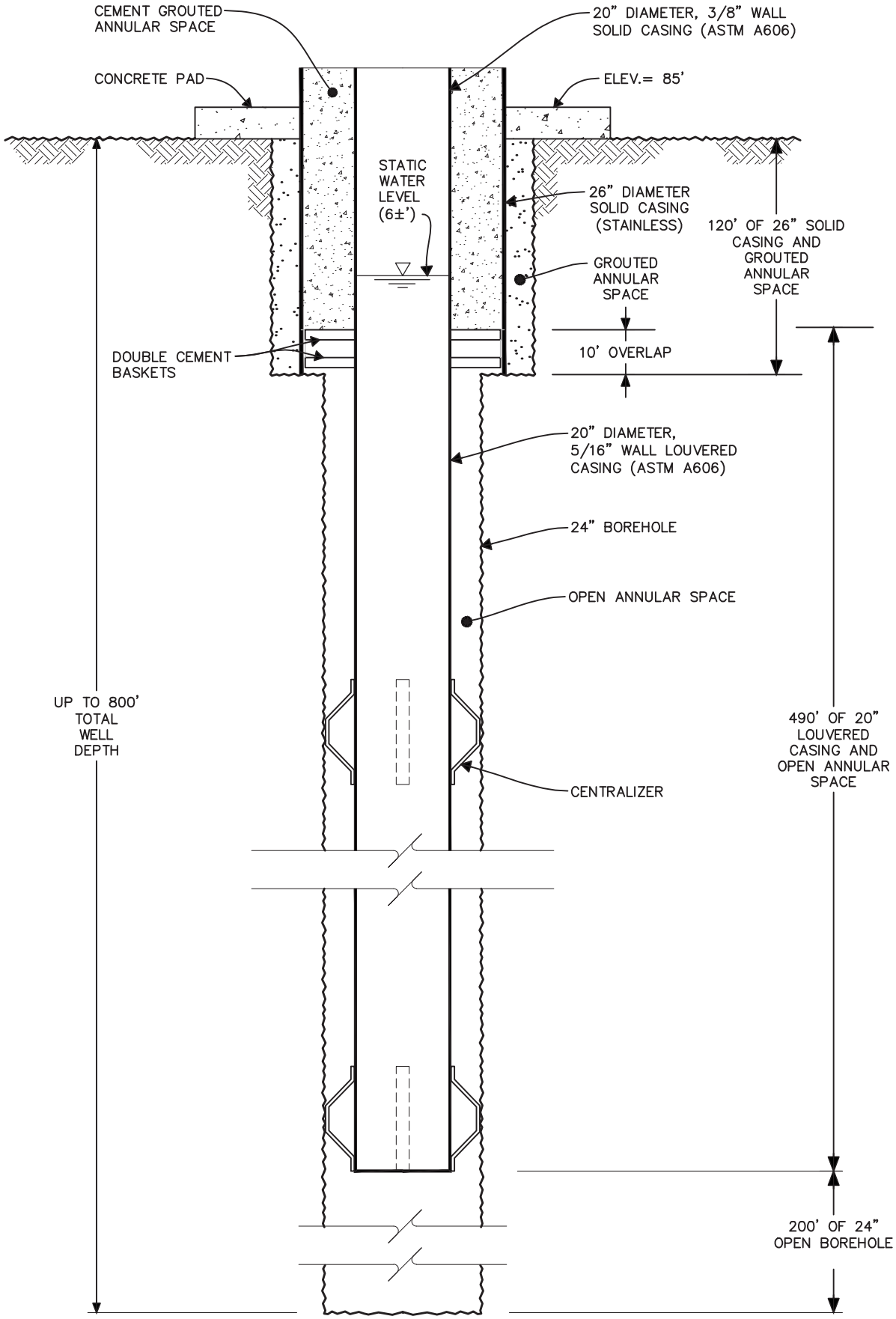


Figure 1

Well Section of Proposed Deepened Disposal Wells

19–01 3–18–19

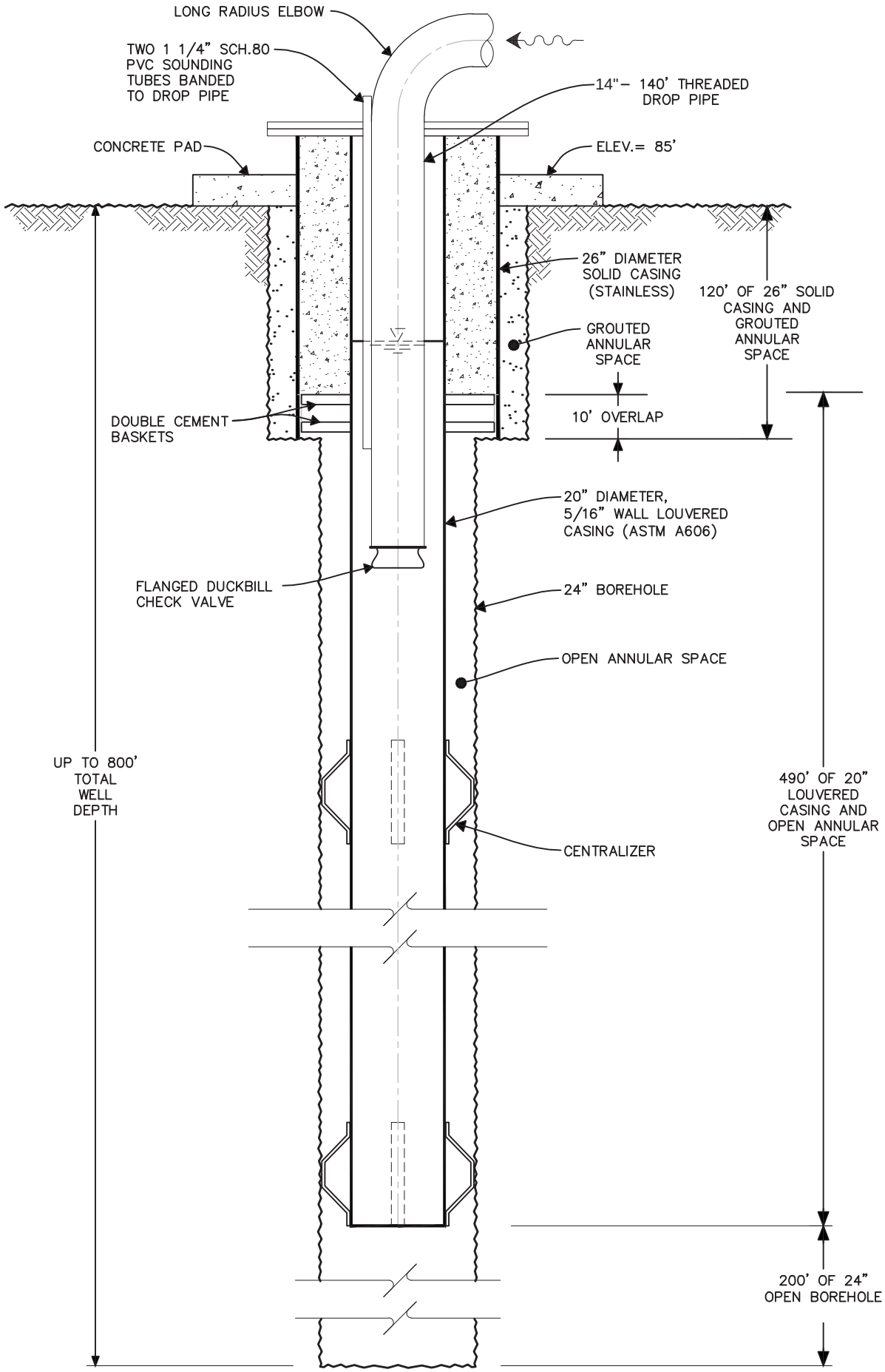


Figure 2

Proposed Drop Pipe for Delivery into the Disposal Wells

19–01 3–18–19

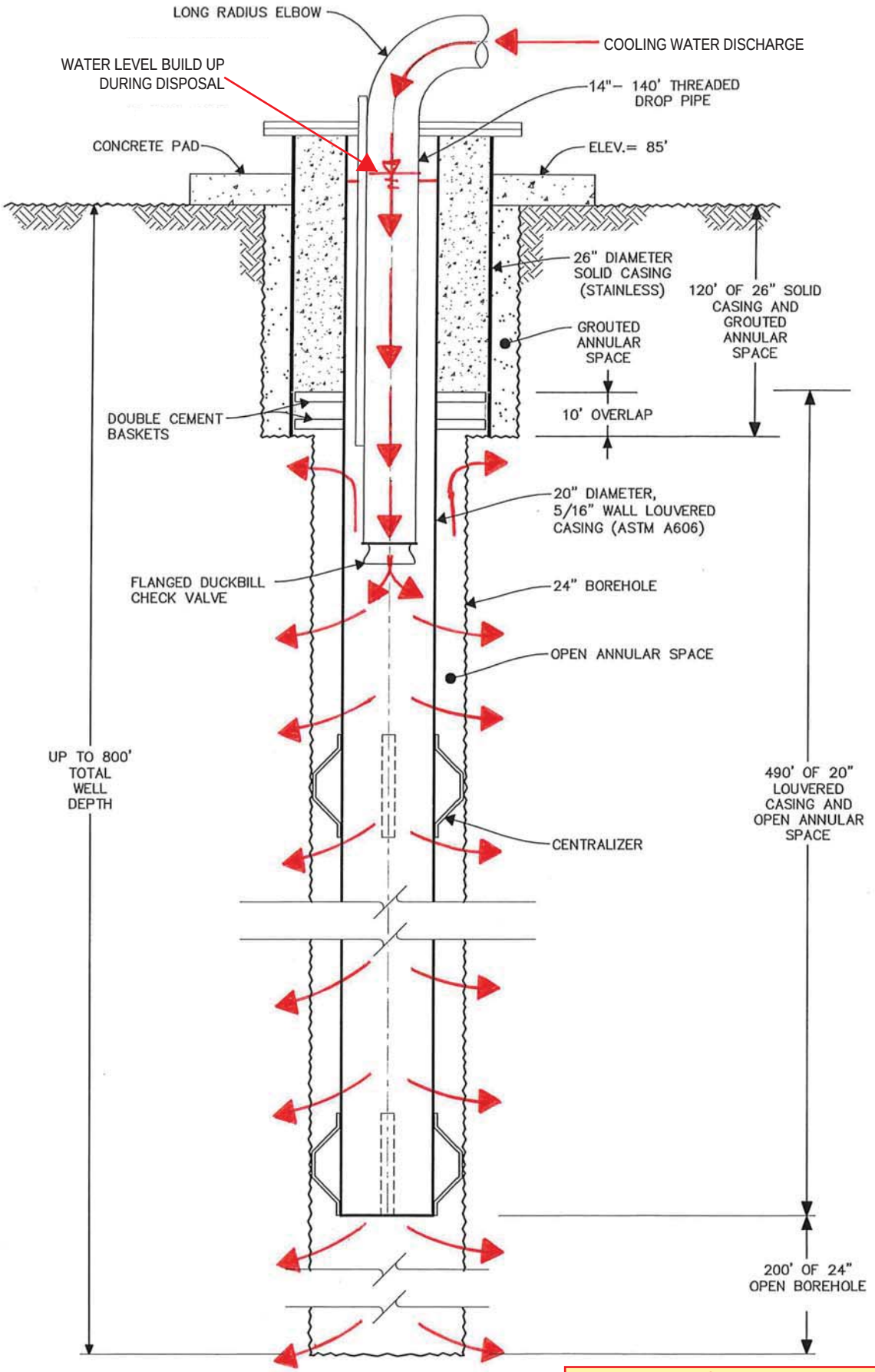
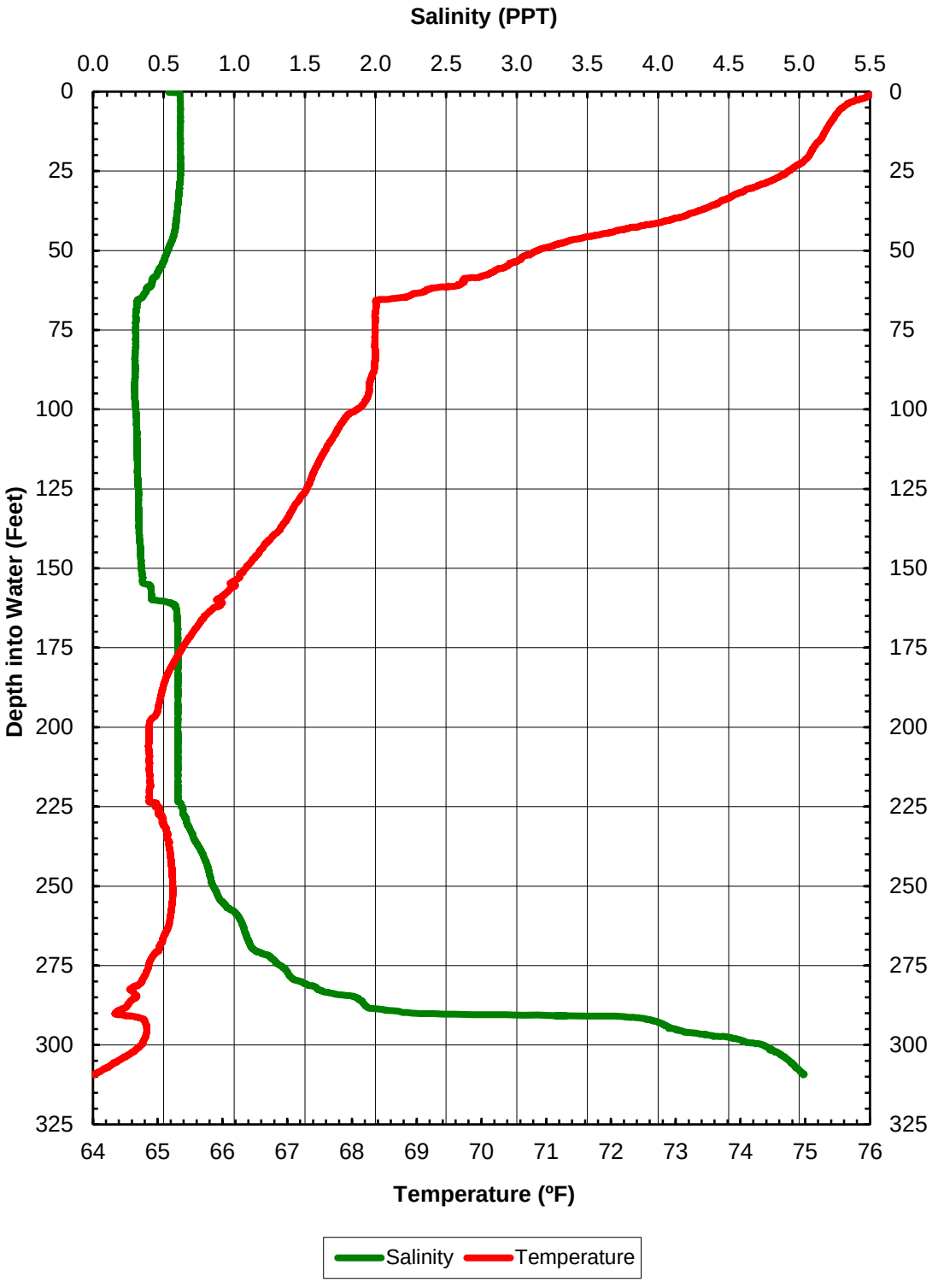
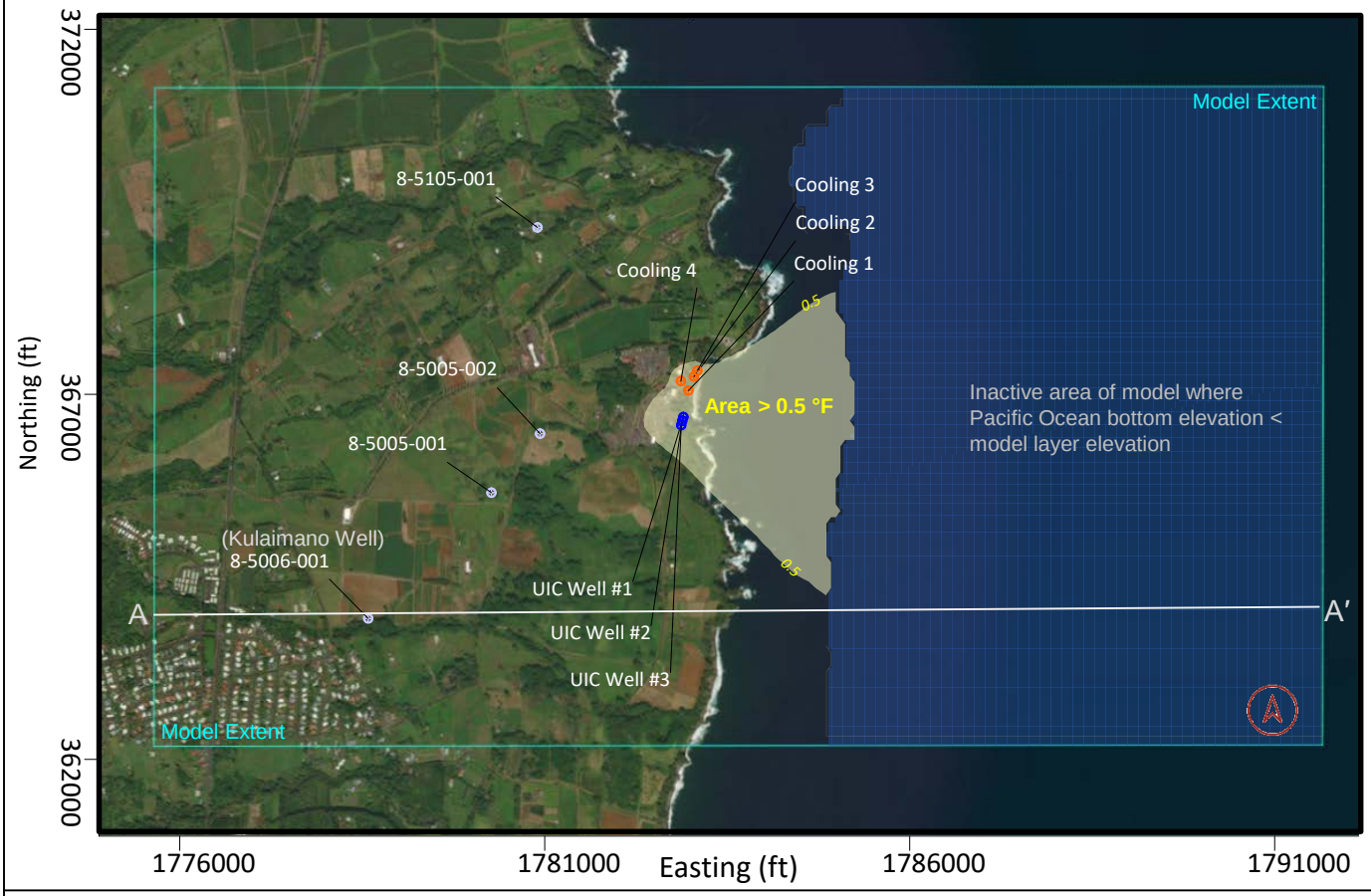


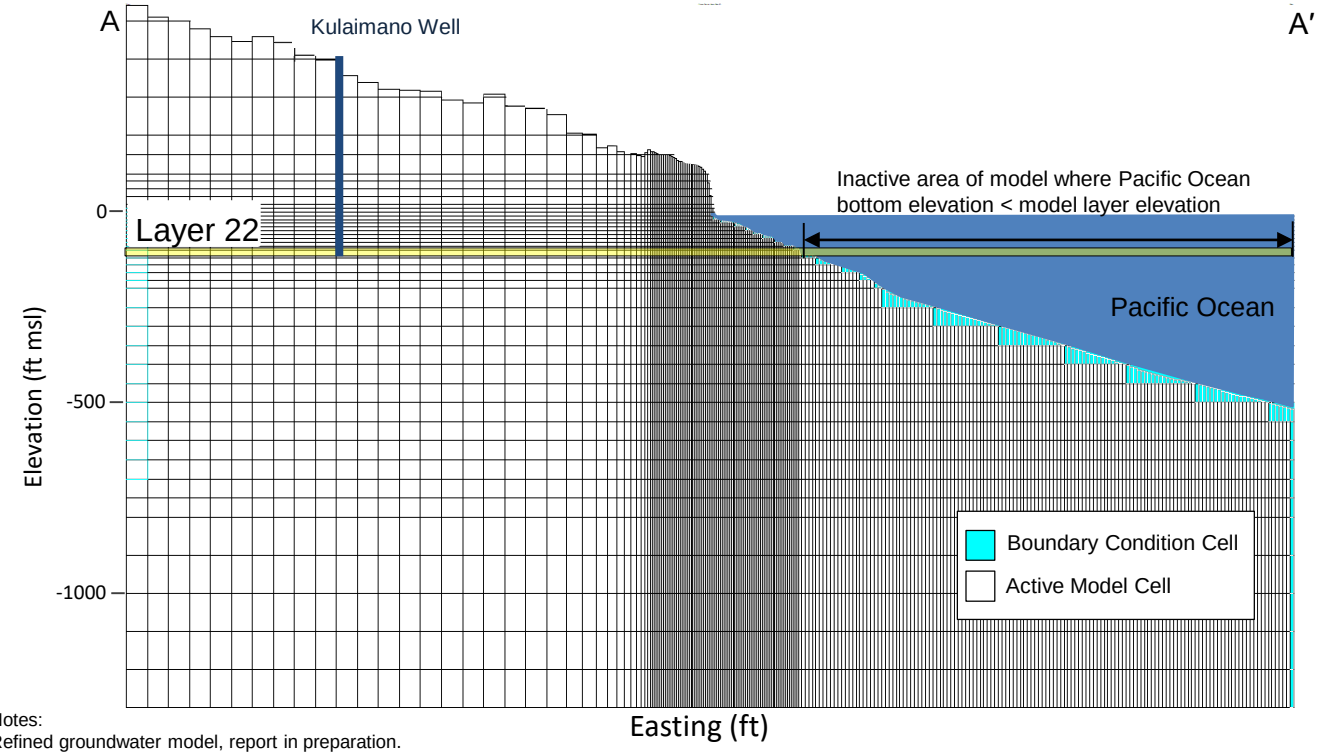
Figure 2A

Delivery of Cooling Water Discharged into the Disposal Wells

Figure 3
Salinity and Temperature Profile through the Water Column
of Hu Honua UIC Well No. 1 on January 7, 2019







Notes:
Refined groundwater model, report in preparation.
Change in temperature between anticipated operating scenario and no HHB operations (base case) after 50 years of operations.
Temperatures shown in model layer 22 (-100 to -110 ft msl, bottom of Kulaimano well at -114 msl).
Coordinate System: NAD83/Hawaii US ft.

integral consulting inc.

Figure 4.
Model Cross Section and Area where Model-Simulated change in Groundwater Temperature Exceeds 0.5 °F in Model Layer 22 (-100 to -110 ft msl), Anticipated Operating Scenario

THERMAL ANALYSIS OF FUTURE COOLING WATER DISCHARGE
REFINED GROUNDWATER MODELING
Hu Honua Bioenergy, Pepeekeo, Hawaii

This memorandum provides technical information regarding thermal analysis of planned spent cooling water discharge into a suite of underground injection control (UIC) wells at the Hu Honua Bioenergy (HHB) facility. The evaluation of the thermal effects of spent cooling water and its potential temperature effects on ocean water were described in the Integral report entitled *Thermal Analysis of Future Cooling Water Discharge, Hu Honua Bioenergy, Pepeekeo, Hawaii*, dated May 1, 2018.

A more robust "refined" numerical groundwater model is currently being constructed to provide more accurate estimates of the distribution of thermal effects as a result of injected spent cooling water migration and discharge to the adjacent ocean. The refined model evaluates UIC wells extending to 800 feet depth, as opposed to 400 feet depth evaluated in the original model.

In summary, the refined modeling of spent cooling water discharge to 800-foot deep UIC wells indicates a temperature change of well less than 1.0°C (1.8°F) at the bottom of the ocean. Actual monitoring of bottom ocean temperatures in the anticipated area of thermal discharge will be conducted to confirm model predictions. The anticipated area of thermal discharge offshore of the HBB facility is shown on the attached figure.

Refined Groundwater Model

Integral is in the process of building a more refined groundwater numerical model, of larger aerial extent with finer (smaller) grid cells and layers than the original model. The refined model will improve the accuracy of predictions of groundwater flow and thermal distribution during cooling water pumping and spent cooling water discharge to UIC wells. The refined model extent is 16,000 feet in the east-west direction and 9,000 feet in the north-south direction, centered over the HHB facility (see Figure 1). The model includes 46 vertical layers and extends to 1500 feet below sea level elevation. The total number of model cells in the refined model is approximately one million. Grid cells are finer across the area of HHB production and UIC wells, with the fine cell resolution carried offshore into the anticipated area of thermal discharge of groundwater at the ocean floor.

Model simulations were run under an anticipated operating scenario of 21.6 million gallons per day of groundwater pumped from three cooling water production wells, and the same flow discharged as spent cooling water to three 800-foot deep UIC wells. The temperature

of spent cooling water was modeled at 29.6°C (85.3°F), based on engineering calculations using an expected temperature of raw cooling water from production wells at 20°C (68°F)[1]. Based on preliminary model runs, the area of anticipated thermal discharge at the ocean floor, as a result of spent cooling water injection, is located offshore of the HHB facility as shown on the attached figure.

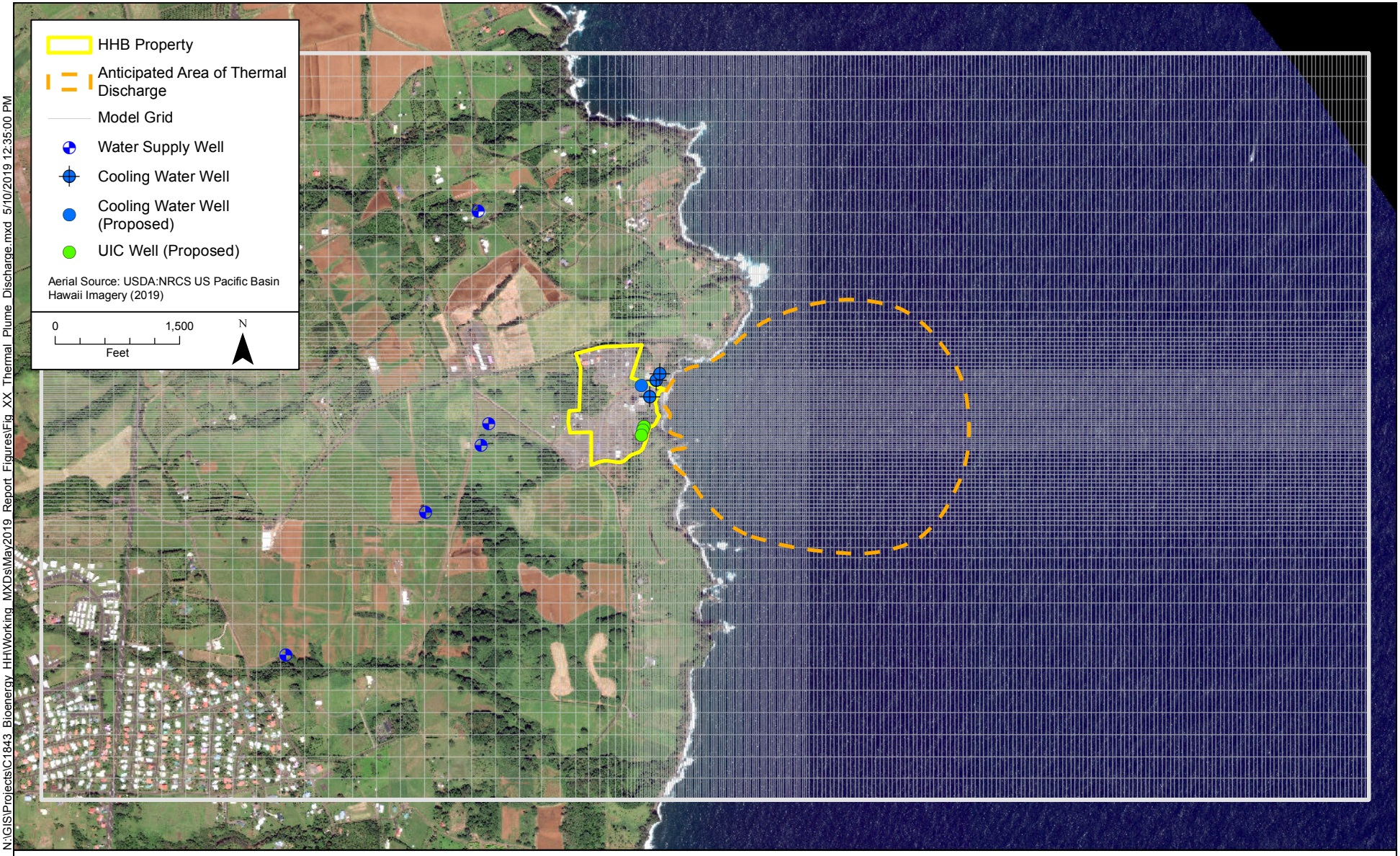
Anticipated Thermal Effects

Consistent with the results of the original modeling work, after several years when temperature equilibrium is achieved, the temperature of groundwater within the aquifer below the aquifer/ocean interface will be slightly cooler than the UIC discharge temperature. Prior modeling (with original groundwater model) of thermal discharge from groundwater into the bottom ocean water indicated less than 1.0°C (1.8°F) of temperature increase above ambient at the ocean bottom. The current refined model, with 800-foot deep UIC wells, indicates groundwater temperatures about 1.1°C (2°F) cooler than under the prior model. Although refined modeling work has not yet progressed to estimates of bottom water temperature using the refined groundwater model output, we anticipate similar findings of less than 1.0°C (1.8°F) of temperature increase above ambient temperature at the ocean floor.

Planned Ocean Bottom Monitoring Program – Model Validation

In order to validate the predictions provided by the refined numerical groundwater model, an ocean floor thermal monitoring program is being planned by HHB, to be implemented prior to UIC well operations and continuing into the operational period. The monitoring program will include deployment of temperature loggers at multiple locations on the ocean floor across the area of anticipated thermal discharge. At each monitoring location a pair of temperature data loggers will be placed at the ocean floor and 1 meter above the ocean floor. In addition, acoustic doppler current profilers will be deployed to further understand heat dissipation. The monitoring program data will validate, and in fact will supersede predictions of thermal effects from modeling.

[1] Prior modeling assumed a raw cooling water temperature of 21.1°C (70°F) in the absence of site-specific data. However, a recent temperature profile in the first UIC well drilled to 400 feet depth showed a maximum temperature of 20.2°C (68.4°F) below surface casing at -60 feet mean sea level, and cooler water to 17.8°C (64°F) near the bottom of well at -300 feet mean sea level.



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integral consulting inc.

Refined Numerical Groundwater Model Grid and
Anticipated Area of Thermal Discharge,
Hu Honua Bioenergy Facillity, Pepeekeo, Hawaii

Date	Attachment Name	Context	Confidential?
2/26/2018 8:47 PM	Fig1_vicinity_map.pdf	v9 - Location	No
2/26/2018 8:49 PM	TMK Map.pdf	v9 - Location	No
4/2/2018 9:05 PM	3 D TRASAR 3DT120.pdf	v9 - Injection System	No
4/2/2018 9:06 PM	NALCO 352.pdf	v9 - Injection System	No
4/2/2018 9:06 PM	NALCO BC2036.pdf	v9 - Injection System	No
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4/2/2018 9:06 PM	NexGuard 22300.pdf	v9 - Injection System	No
4/2/2018 9:06 PM	PermaTreat PC-391T.pdf	v9 - Injection System	No
5/4/2018 9:51 AM	Land owner consent HHB UH-3051.pdf	v9 - Fee Simple Land Owner	No
5/17/2018 10:11 AM	Boiler_noncontat Chem addatives usage 5-17-18.pdf	v9 - Injection System	No
3/19/2019 4:27 PM	HHB Well Location Map.pdf	v9 - Location	No
7/25/2019 5:52 PM	PE License 10776 - Expires 4-30-2020 (4-3-2018).pdf	v9 - Consultant	No
7/31/2019 4:48 PM	HHB Well Design Figure 1 and 2.pdf	v9 - Well Dimensions	No
7/31/2019 4:49 PM	HHB Well Design Figure 1 and 2.pdf	v9 - Well Dimensions	No
7/31/2019 4:49 PM	HHB Well Design Figure 1 and 2.pdf	v9 - Well Dimensions	No
8/6/2019 12:43 PM	20190401 UH 3051 HU HONUA SITEPLAN In.pdf	v9 - Location	No
8/6/2019 12:44 PM	726004C901 Rev 2 Cooling Water Return Plan Sections and Details (2)-v6(1).pdf	v9 - Location	No
8/6/2019 12:49 PM	HHB Water Balance 726004F05 7-30-19.pdf	v9 - Injection System	No
8/6/2019 12:50 PM	726004C901 Rev 2 Cooling Water Return Plan Sections and Details (2)-v6(1).pdf	v9 - Injection System	No
8/6/2019 12:50 PM	FINAL_Summary WW Process Chemistry_UIC 8-6-19.pdf	v9 - Injection System	No
8/6/2019 1:01 PM	HHB Request to Deepen wells 7-31-19.pdf	v9 - Special Comments or Considerations	No
8/6/2019 1:01 PM	20190516 HHB Integral Memo Thermal Study Progress 2019-05-16.pdf	v9 - Special Comments or Considerations	No

Status History

Date	User	Processing Status

NALCO

SAFETY DATA SHEET

PRODUCT

3D TRASAR® 3DT120

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **3D TRASAR® 3DT120**

APPLICATION : COOLING WATER TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER : 0
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. May cause gastrointestinal irritation.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Get medical attention. Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : Not applicable

EXTINGUISHING MEDIA :
Water, Carbon dioxide, Dry powder, Foam
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water., Prevent material from entering sewers or waterways., If drains, streams, soil or sewers become contaminated, notify local authority.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed.

UNSUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If

respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled, but we have positive experience under light handling conditions using gloves made from PVC Gloves should be replaced immediately if signs of degradation are observed. Breakthrough time not determined as preparation, consult PPE manufacturers.

SKIN PROTECTION :
See general advice.

EYE PROTECTION :
Wear safety glasses with side-shields.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Consider the provision in the work area of a safety shower and eyewash. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Yellow
ODOR	Neutral

SPECIFIC GRAVITY	1.113 - 1.149
SOLUBILITY IN WATER	Complete
pH (100 %)	2.4 - 3.6
VISCOSITY	39.93 - 42.69 cst
POUR POINT	28.4 °F / -2.0 °C
VOC CONTENT	0.0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Bases Contact with strong alkalies (e.g. ammonia and its solutions, carbonates, sodium hydroxide (caustic), potassium hydroxide, calcium hydroxide (lime), cyanide, sulfide, hypochlorites, chlorites) may generate heat, splattering or boiling and toxic vapors. SO2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon

11. TOXICOLOGICAL INFORMATION

The following results are for the product, unless otherwise indicated.

ACUTE ORAL TOXICITY :
Species: Rat
LD50: 5,000 mg/kg
Test Descriptor: Similar Product

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: > 2,000 mg/kg
Test Descriptor: Similar Product

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Bluegill Sunfish	96 hrs	> 5,000 mg/l	Similar Product
Rainbow Trout	96 hrs	> 8,000 mg/l	Product

Inland Silverside	96 hrs	3,736 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	1,339 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	3,750 mg/l		Similar Product

PERSISTENCY AND DEGRADATION :

Total Organic Carbon (TOC) : 120,000 mg/l

Chemical Oxygen Demand (COD) : 300,000 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	175 mg/l	Product

The organic portion of this preparation is expected to be poorly biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is:
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 141583
This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Bisulfite • Sulfuric Acid	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : SHE Department
Date issued : 03/28/2011
Version Number : 1.14

NALCO

SAFETY DATA SHEET

PRODUCT

NALCO® 352

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 352**

APPLICATION : CORROSION INHIBITOR

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Morpholine	110-91-8	40.0 - 70.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. May cause tissue damage. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Use a mild soap if available. Protect product from freezing.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.
Fire or intense heat may cause violent rupture of packages.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage.

SKIN CONTACT :
Corrosive; causes permanent skin damage.

INGESTION :
Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Irritating, in high concentrations, to the eyes, nose, throat and lungs. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. Use a mild soap if available. For a large splash, flood body under a shower. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
Get immediate medical attention. DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. Get immediate medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : Minimum > 200 °F / > 93.3 °C (PMCC)

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Fire or intense heat may cause violent rupture of packages.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Prevent material from entering sewers or waterways.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Avoid generating aerosols and mists. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not mix with acids.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed. Store separately from oxidizers. Store separately from acids. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Stainless Steel 316L, Carbon steel, PTFE, Buna-N, Polyethylene, Polypropylene, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Aluminum, Brass, Nickel, Polyurethane, Fluoroelastomer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Substance(s)	Category	ppm	mg/m3	Non-Standard Unit
Morpholine	ACGIH/TWA	20		
	ACGIH/Skin*			
	OSHA Z1/PEL	20	70	
	OSHA Z1/Skin*			

* Can be absorbed through the skin.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Moderate

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Light yellow

ODOR	Slight, Ammoniacal
SPECIFIC GRAVITY	1.02 - 1.04 @ 77 °F / 25 °C
DENSITY	8.5 - 8.6 lb/gal
SOLUBILITY IN WATER	Complete
pH (1 %)	9.1
pH (100 %)	10.5
VISCOSITY	5.5 cps @ 77 °F / 25 °C
FREEZING POINT	-8 °F / -22 °C
INITIAL BOILING POINT	/ 100 °C
VAPOR PRESSURE	50 mm Hg @ 68 °F / 20 °C
VOC CONTENT	17 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Avoid contact with SO2 or acidic bisulfite products, which may react to form visible airborne amine salt particles. Certain amines in contact with nitrous acid, organic or inorganic nitrites or atmospheres with high nitrous oxide concentrations may produce N-nitrosamines, many of which are cancer-causing agents to laboratory animals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

The following results are for the product.

ACUTE ORAL TOXICITY :

Species:	Rat
LD50:	3,053 mg/kg
Test Descriptor:	Product

ACUTE DERMAL TOXICITY :

Species:	Rabbit
LD50:	> 3,083 mg/kg
Test Descriptor:	Product

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

MUTAGENICITY :
Mutagenicity tests on morpholine provided the following results: A bacterial mutagenicity (Ames) bioassay was negative; sister chromatid exchange transformation was positive; mouse lymphoma was weakly positive and rat hepatocyte/DNA repair was negative.

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Rainbow Trout	96 hrs	LC50	384 mg/l	Product
Fathead Minnow	96 hrs	LC50	132 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Daphnia magna	48 hrs	EC50	331.2 mg/l	Product

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 703,000 mg/l

The organic portion of this preparation is expected to be readily biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is

intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages:

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, N.O.S.
Technical Name(s) :	MORPHOLINE
UN/ID No :	UN 2735
Hazard Class - Primary :	8
Packing Group :	II
Flash Point :	Minimum > 93.3 °C / > 200 °F

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, N.O.S.
Technical Name(s) :	MORPHOLINE

UN/ID No :	UN 2735
Hazard Class - Primary :	8
Packing Group :	II

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, N.O.S.
Technical Name(s) :	MORPHOLINE
UN/ID No :	UN 2735
Hazard Class - Primary :	8
Packing Group :	II

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Morpholine : Corrosive, Flammable, HARMFUL

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

The following limitations apply:

Maximum dosage	Limitation
25 PPM	as product in the steam

This product can not be used where the steam produced will contact milk or milk products.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062469
This product is acceptable for treating boilers or steam lines where steam produced may contact edible products and/or cooling systems where the treated water may not contact edible products in and around food processing areas (G6).

This product has been certified as KOSHER/PAREVE for year-round use EXCEPT FOR THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Morpholine	110-91-8

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Moderate

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the

recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva. World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 04/10/2012
Version Number : 1.17

NALCO

SAFETY DATA SHEET

PRODUCT

NALCO® BC2036

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® BC2036**

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 1 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Use a mild soap if available.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. There may be irritation to the gastro-intestinal tract with nausea and vomiting.

INHALATION :
Not a likely route of exposure. Repeated or prolonged exposure may irritate the respiratory tract.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. Use a mild soap if available. If symptoms develop, seek medical advice.

INGESTION :
Get medical attention. Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : > 200 F/ > 93.3 °C

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Keep people away from and upwind of spill/leak. Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Prevent material from entering sewers or waterways.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed. Store separately from acids. Store separately from oxidizers.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear safety glasses with side-shields.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Amber
ODOR	Mild
SPECIFIC GRAVITY	1.16 - 1.18
SOLUBILITY IN WATER	Complete
pH (100.0 %)	8.0

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Avoid extremes of temperature.
Keep at temperature not exceeding 50 °C

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

No toxicity studies have been conducted on this product.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	Sodium Phosphate, Tribasic
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	> 200 F/ > 93.3 °C
Reportable Quantity (per package) :	74,514 lbs
RQ Component :	SODIUM PHOSPHATE, TRIBASIC

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID,

	N.O.S.
Technical Name(s) :	Sodium Phosphate, Tribasic
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Reportable Quantity (per package) :	74,514 lbs
RQ Component :	SODIUM PHOSPHATE, TRIBASIC

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Phosphate, Tribasic	75,414 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

The following limitations apply:

Maximum dosage	Limitation
30 PPM AS PRODUCT	in the boiler feedwater

Limitations: no more than required to produce intended technical effect. Steam produced may be used in contact with any food type, defined under 21 CFR 170.3, which includes milk or milk products.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 146060
This product is acceptable for treating boilers or steam lines where steam produced may contact edible products and/or cooling systems where the treated water may not contact edible products in and around food processing areas (G6).

This product has been certified as KOSHER/PAREVE for year-round use EXCEPT FOR THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Potassium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 09/21/2012
Version Number : 1.7

NALCO

SAFETY DATA SHEET

PRODUCT

NALCO ELIMIN-OX®

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO ELIMIN-OX®**

APPLICATION : OXYGEN SCAVENGER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2* FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous.

Hazardous Substance(s)	CAS NO	% (w/w)
Carbohydrazide	497-18-7	5.0 - 10.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
May cause sensitization by skin contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Protect product from freezing.
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact. May cause sensitization by skin contact.

INGESTION :
Not a likely route of exposure. There may be irritation to the gastro-intestinal tract with nausea and vomiting.

INHALATION :
Not a likely route of exposure. Repeated or prolonged exposure may irritate the respiratory tract.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Remove sources of ignition. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Ensure all containers are labeled. Keep the containers closed when not in use. Do not breathe vapors/gases/dust. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labeled containers.

SUITABLE CONSTRUCTION MATERIAL :
Brass, Carbon Steel C1018, EPDM, FEP (encapsulated), HDPE (high density polyethylene), Hastelloy C-276, MDPE, Nitrile, PVC, Polyurethane, Polypropylene, Polyethylene, Plexiglass, Perfluoroelastomer, PTFE, Stainless Steel 304, Stainless Steel 316L, TFE, Fluoroelastomer

UNSUITABLE CONSTRUCTION MATERIAL :
Aluminum, Buna-N, Ethylene propylene, Mild steel, Natural rubber, Neoprene, Polytetrafluoroethylene/polypropylene copolymer, Chlorosulfonated polyethylene rubber Shipping and long term storage compatibility with construction materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :

General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear safety glasses with side-shields.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Colorless
ODOR	None

SPECIFIC GRAVITY	1.02 @ 68 °F / 20 °C
DENSITY	8.5 - 8.6 lb/gal
SOLUBILITY IN WATER	Complete
pH (1 %)	6.7
VISCOSITY	3.0 cps @ 60 °F / 15.6 °C
FREEZING POINT	28 °F / -2 °C
VAPOR PRESSURE	12 mm Hg @ 68 °F / 20 °C
VOC CONTENT	0.17 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
At temperatures below 4 °C (40 °F), this product loses its stability and forms precipitates. Once formed, the precipitate cannot be resolubilized and loss of product activity will occur.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Nitrites

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

The following results are for the product.

ACUTE ORAL TOXICITY :

Species:	Rat
LD50:	> 5,000 mg/kg
Test Descriptor:	Product

ACUTE DERMAL TOXICITY :

Species:	Rabbit
LD50:	> 2,000 mg/kg
Test Descriptor:	Product

PRIMARY SKIN IRRITATION :

Species:	Rabbit
Draize Score:	0.2 /8.0
Test Descriptor:	Product

PRIMARY EYE IRRITATION :

Species:	Rabbit
Draize Score:	0.3 /110.0
Test Descriptor:	Product

SENSITIZATION :
Repeated or prolonged contact may cause skin sensitization.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Rainbow Trout	96 hrs	LC50	360 mg/l	Product
Bluegill Sunfish	96 hrs	LC50	190 mg/l	Product
Fathead Minnow	96 hrs	LC50	400 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Daphnia magna	48 hrs	LC50	96 mg/l	Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	HYDRAZINE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	None
Reportable Quantity (per package) :	30,670 lbs
RQ Component :	HYDRAZINE

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	HYDRAZINE
UN/ID No :	UN 3082

Hazard Class - Primary :	9
Packing Group :	III
Reportable Quantity (per package) :	30,670 lbs
RQ Component :	HYDRAZINE

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Carbohydrazide : Dermal Sensitizer

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Hydrazine	30,670 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 145925
This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas. This product is acceptable for treating boilers, steam lines, and/or cooling systems (G7) where neither the treated water nor the steam produced may contact edible products in and around food processing areas.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Hydrazine	Sec. 112

CALIFORNIA PROPOSITION 65 :
This product contains the following substances which require warning under California Proposition 65. Additional components may be unintentionally present at trace levels.

Substance(s)	Concentration	EFFECTS
• Hydrazine	<= .01 %	Causes Cancer

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 03/26/2012
Version Number : 1.15

NALCO

SAFETY DATA SHEET

PRODUCT

NALCO® TRAC108

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® TRAC108**

APPLICATION : CORROSION INHIBITOR

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Nitrite	7632-00-0	10.0 - 30.0
Inorganic salt	Proprietary	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Contains sodium nitrite. May be harmful or fatal if swallowed. Substances in the product can lead to the formation of methemoglobin. Unborn children are particularly sensitive to methemoglobinemia. May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing, gloves and eye/face protection.
May evolve oxides of nitrogen (NOx) under fire conditions. If product is allowed to dry, the sodium nitrite is an oxidizing agent and can initiate the combustion of other materials.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. Large exposures may be fatal. Ingestion of sodium nitrite can cause methemoglobinemia which can lead to cyanosis and possible death. Pregnant women and their fetuses are particularly sensitive to the effects of methemoglobinemia.

INHALATION :
Not a likely route of exposure. Repeated or prolonged exposure may irritate the respiratory tract.

AGGRAVATION OF EXISTING CONDITIONS :
Sodium Nitrite. Pregnant women are particularly sensitive to methemoglobinemia.

HUMAN HEALTH HAZARDS - CHRONIC :
Repeated ingestion of small amounts of sodium nitrite causes drops in blood pressure, rapid pulse, headaches and visual disturbances. It may also react with organic amines in the body to form carcinogenic nitrosamines.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Get immediate medical attention. DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink.

INHALATION :
First aid is normally not required. Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 212.0 °F / 100.0 °C

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of nitrogen (NOx) under fire conditions. If product is allowed to dry, the sodium nitrite is an oxidizing agent and can initiate the combustion of other materials.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Do not allow product to evaporate to dryness. Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Prevent material from entering sewers or waterways., Spilled product may pose a risk to the aquatic ecosystem if released., If drains, streams, soil or sewers become contaminated, notify local authority.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed. Store away from organic chemicals and other oxidizable materials, reducing agents, acids and alkalis.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
If significant mists, vapors or aerosols are generated an approved respirator is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing. See general advice.

EYE PROTECTION :
When handling this product, the use of safety glasses with side shields is recommended.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear
ODOR	Organic
SPECIFIC GRAVITY	1.23 @ 70.0 °F / 21.1 °C
DENSITY	10.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (100.0 %)	11.3
VISCOSITY	1.6 cps @ 70.0 °F / 21.1 °C
VOC CONTENT	0.0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Avoid extremes of temperature. Do not allow product to evaporate to dryness. Dried product residue can act as an oxidizer.

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contact with reducing agents (e.g. hydrazine, sulfites, sulfide, aluminum or magnesium dust) may generate heat, fires, explosions and toxic vapors. Do not mix with amines. Sodium nitrite can react with certain amines to produce N-nitrosamines, many of which are cancer-causing agents to laboratory animals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	384 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Ceriodaphnia dubia	48 hrs	159 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	TOXIC LIQUID, INORGANIC, N.O.S
Technical Name(s) :	Sodium Nitrite
UN/ID No :	UN 3287
Hazard Class - Primary :	6.1
Packing Group :	III

Flash Point :	100.0 °C / 212.0 °F
DOT Reportable Quantity (per package) :	406 lbs
DOT RQ Component :	SODIUM NITRITE

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	TOXIC LIQUID, INORGANIC, N.O.S
Technical Name(s) :	Sodium Nitrite
UN/ID No :	UN 3287
Hazard Class - Primary :	6.1
Packing Group :	III
IATA Cargo Packing Instructions :	618
IATA Cargo Aircraft Limit :	220 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	TOXIC LIQUID, INORGANIC, N.O.S
Technical Name(s) :	Sodium Nitrite
UN/ID No :	UN 3287
Hazard Class - Primary :	6.1
Packing Group :	III

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Nitrite : Target Organ Effect - Kidney, Target Organ Effect - Nervous system, Target Organ Effect - Blood
Inorganic salt : Irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Nitrite	406 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
X	Delayed (Chronic) Health Hazard
	Fire Hazard
	Sudden Release of Pressure Hazard
	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Nitrite	7632-00-0	10.0 - 30.0

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 141488
This product is acceptable for treating boilers, steam lines, and/or cooling systems where neither the treated water nor the steam produced may contact edible products in and around food processing areas, excluding such use in areas where meat and poultry are processed (G10).

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Nitrite • Sodium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Methanol	Sec. 112

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws.

Sodium Nitrite 7632-00-0

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
D1B - Materials Causing Immediate and Serious Toxic Effects - Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 07/31/2009
Version Number : 1.6

NALCO

SAFETY DATA SHEET

PRODUCT

NexGuard® 22300

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NexGuard® 22300**

APPLICATION : BOILER WATER TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Use a mild soap if available.
Wear suitable protective clothing.
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. There may be irritation to the gastro-intestinal tract with nausea and vomiting.

INHALATION :
Not a likely route of exposure. Repeated or prolonged exposure may irritate the respiratory tract.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush with large amounts of water. Use soap if available. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : Not flammable

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Prevent material from entering sewers or waterways.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not mix with acids.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed. Store separately from acids.

SUITABLE CONSTRUCTION MATERIAL :
Brass, Stainless Steel 304, Stainless Steel 316L, Neoprene, EPDM, Polyurethane, Polyethylene, Polypropylene, PVC, HDPE (high density polyethylene), Buna-N, Epoxy phenolic resin, 100% phenolic resin liner, Chlorosulfonated polyethylene rubber, Fluoroelastomer

UNSUITABLE CONSTRUCTION MATERIAL :
Mild steel

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear safety glasses with side-shields.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep a safety shower available. Keep an eye wash fountain available. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Moderate

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Yellow Orange
ODOR	Slight

SPECIFIC GRAVITY	1.08 @ 77 °F / 25 °C
DENSITY	8.8 - 9.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	8.0 - 12.5
FREEZING POINT	30 °F / -1 °C
VAPOR PRESSURE	Same as water
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Strong acids

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species:	Rat
LD50:	> 5,000 mg/kg
Test Descriptor:	Similar Product

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product and a similar product.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Rainbow Trout	96 hrs	LC50	> 1,000 mg/l	Similar Product
Fathead Minnow	96 hrs	LC50	> 1,000 mg/l	Similar Product
Inland Silverside	96 hrs	LC50	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Daphnia magna	48 hrs	LC50	> 1,000 mg/l	Similar Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	LC50	> 5,000 mg/l	Product
Daphnia magna	48 hrs	EC50	> 1,000 mg/l	Similar Product

AQUATIC PLANT RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Green Algae (Pseudokirchneriella subcapitata, previously Selenastrum capricornutum)	96 hrs	EC50	53 mg/l	Product
Green Algae (Pseudokirchneriella subcapitata, previously Selenastrum capricornutum)	96 hrs	NOEC	< 13 mg/l	Product

PERSISTENCY AND DEGRADATION :

The organic portion of this preparation is expected to be poorly biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

The following limitations apply:

Maximum dosage	Limitation
173.310: 1000 PPM	as product in the boilerwater

The polymer must not be used at pressures above 1,000 PSIG (6895 kPa). Limitation for 176.170 and 176.180: When used as a boiler water additive in papermill boilers at a level not to exceed 150 ppm in the boiler water, where the boiler blowdown water is recycled into the wet-end of the paper process at a maximum concentration of 60% based on the

weight of dry pulp, this product complies with all applicable Federal Food Additive Regulations including 21 CFR 176.170 and 176.180. Steam produced may be used in contact with any food type, defined under 21 CFR 170.3, which includes milk or milk products.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 121214
This product is acceptable for treating boilers or steam lines where steam produced may contact edible products and/or cooling systems where the treated water may not contact edible products in and around food processing areas (G6).

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Cupric Sulphate	Sec. 307, Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Components listed under this regulation may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
This product and/or component(s) are exempt or excluded from the list of Existing and New Chemical Substances (ENCS) under the Law Regulating the Manufacture and Importation Of Chemical Substances.

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the

recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 06/27/2012
Version Number : 2.3

NALCO

SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391T

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **PermaTreat® PC-391T**

APPLICATION : REVERSE OSMOSIS ANTISCALANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. There may be irritation to the gastro-intestinal tract with nausea and vomiting.

INHALATION :
Not a likely route of exposure. Repeated or prolonged exposure may irritate the respiratory tract.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush with large amounts of water. Use soap if available. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None > 200 °F /

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Keep containers cool by spraying with water. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed.

UNSUITABLE CONSTRUCTION MATERIAL :
Shipping and long term storage compatibility with construction materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear safety glasses with side-shields.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Dark Amber
ODOR	Amine

SPECIFIC GRAVITY	1.11 @ 60 °F / 15.6 °C
DENSITY	9.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	10.8

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Strong acids Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen, Oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the active components.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Rainbow Trout	96 hrs	LC50	160 mg/l	Active Substance
Channel Catfish	96 hrs	LC50	1,212 mg/l	Active Substance
Sheepshead Minnow	96 hrs	LC50	> 5,000 mg/l	Active Substance
Bluegill Sunfish	96 hrs	LC50	> 330 mg/l	Active Substance

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Grass Shrimp	96 hrs	LC50	> 5,000 mg/l	Active Substance
Daphnia magna	48 hrs	EC50	297 mg/l	Active Substance

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

NSF INTERNATIONAL :
This product has received NSF/International certification under NSF/ANSI Standard 60 in the reverse osmosis antiscalant category. The official name is "Miscellaneous Water Supply Products." Maximum product application dosage is : 15 mg/l.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should

be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

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