



# HAB SCREENING – NEW VOLUNTEER

This kit contains all of the new items that you will need to begin sampling, except for the microscope.

## SAMPLING EQUIPMENT

- 1 - 20µm Sea-Gear student plankton net
- 1 - VEE GEE salt refractometer (STX-3); Serial #
- 1 - Enviro-Safe "Easy Read" armor case thermometer (0.5 grad Celcius)
- 1 pack - NeoSCI ruled microscope slides (5 slides)
- 1 pack - Plastic coverslips

## HAB SCREENING SAMPLING SUPPLIES

- 2 - 1L bottles  
*Purpose: collecting and shipping 1L whole water live samples for toxin analysis*
- 4 - 125mL bottles  
*Purpose: collecting net sample and shipping 125mL preserved net samples for advanced microscopy*
- 6 - 30mL bottles  
*Purpose: collecting and shipping 30mL whole water preserved samples for enumeration*
- 5 - Plastic pipettes
- 30 mL Lugol's solution (in a slider zip bag) with dedicated pipette and MSDS  
*Purpose: preserving phytoplankton samples*

## HAB SCREENING SHIPPING SUPPLIES

- 2 - 9" x 12" white poly shipping mailers  
*Purpose: shipping MONTHLY target species samples*
- 2 - UPS Ground pre-printed shipping document  
*Purpose: shipping monthly target species samples*
- 1 - UPS Next Day Air pre-printed shipping document  
*Purpose: shipping elevated PRIORITY target species samples*
- 1 - Roll of vinyl electrical tape (½" x 200")  
*Purpose: taping around bottle cap before shipping*
- 3 - Slider zip bags  
*Purpose: packaging 125mL and 30mL bottles before shipping*
- Universal sample labels (for 1L, 125mL and 30mL bottles)

## HAB SCREENING VOLUNTEER MATERIALS

- HAB Screening datasheets
- Target HAB Species ID sheet
- Other Phytoplankton ID assistance sheet
- Screening protocols

### INVENTORY ALERT:

If an item is  but you do not have it in the package, please send an email to [jennifer.maucher@noaa.gov](mailto:jennifer.maucher@noaa.gov)

## SAMPLING PROTOCOL OVERVIEW

REQUIREMENT OF 26 SAMPLES A YEAR – ONCE EVERY 2 WEEKS

*We hope you can sample more frequently, preferably once every week.*

### STEP 1: NET TOW SAMPLE

Conduct a 3-minute horizontal, surface net tow with 125mL bottle **IMPORTANT:**  
*Use a timepiece to measure the 3 minutes*



### STEP 2: WHOLE WATER SAMPLES

Record water temperature and salinity (+ other optional parameters)

### STEP 2: WHOLE WATER SAMPLES

Fill 1 L and 30mL bottles with water



### STEP 3: NET TOW SAMPLE ANALYSIS

**TIMEFRAME:** Analyze sample within 3 hours, maximum 18 hours

Analyze a **SINGLE SLIDE** of sample (2 drops) using 100x and 400x

Screen for **TARGET SPECIES**

**NO COUNTING!**

**NO** (None) – **YES** (Some) – **ELEVATED** ( $\geq 60\%$ )

**TAKE PHOTOS!**

*You can use your cell phone camera!*

*Email pictures to [pmn@noaa.gov](mailto:pmn@noaa.gov)*



### STEP 4: UPS SAMPLE SHIPPING

If **TARGET SPECIES** are found, prepare samples for shipping

*Refer to datasheet for specific shipping instructions per target species*

*Use symbols to determine which bottles to preserve and ship*

### STEP 5: DATA ENTRY

Enter data via the online form at

<https://products.coastalscience.noaa.gov/pmn/>

## NET TOW SAMPLE ANALYSIS

### SAMPLE ANALYSIS TIMEFRAME

Analysis of the net tow sample within 2-3 hours of collecting it is preferred. However, the maximum time between collection and analysis that is acceptable is 18 hours. Make sure to store the 125ml bottle outside of direct sunlight, in a room temperature environment, with a loosened cap. Do NOT refrigerate unless the net tow sample was taken in a cold environment.

### SLIDE PREPARATION

When preparing the net tow sample for analysis, cap the bottle and homogenize (mix) the sample gently by inverting the bottle 3-4 times.



Use a pipette to collect a sample from near the center of the 125mL bottle. Place two drops of the net tow sample onto a gridded microscope slide and gently add a coverslip.

### MICROSCOPE ANALYSIS



Analyze a SINGLE SLIDE of the net tow sample using a compound light microscope. First find phytoplankton by using the lowest power objective lens (typically 4x = 40x total magnification). Then switch back and forth between the 10x and 40x objective lenses (100x & 400x total magnification) to investigate and identify the sample. Use the “lawnmower method” to move through the slide, identifying target species found in each of the 64 boxes on the gridded slide.

**IMPORTANT:** *Adjusting the intensity of the light source (using the iris diaphragm) increases contrast and helps finer structures (like spines and flagella) to appear on some phytoplankton. These structures can be important to identification.*

### TARGET SPECIES

The base requirement is to SCREEN the ENTIRE SLIDE for the target species. **NO COUNTING!**

Evaluate the level of each target species in the sample using the following:

**NO** (None) – **YES** (Some) – **ELEVATED** (Lots)

- **NO** = no cells found in all 64 boxes of the gridded slide
- **YES** = at least 1 cell found on the slide - *up to* - a “few” cells in multiple fields of view
- **ELEVATED** = “several” cells in multiple fields of view - *up to* - cells “everywhere” (or roughly  $\geq 60\%$  of total slide coverage by a single target organism)

Since you are NOT COUNTING, there are no numbers associated with YES and ELEVATED!

Just Remember: NONE – SOME – LOTS

*Please don't worry. The purpose of the HAB Screening Plan is to TAKE OUT ALL doubt!*

**» IF IN DOUBT, PRESERVE IT & SHIP IT OUT «**

### OTHER SPECIES (OPTIONAL)

Optional data on phytoplankton community composition can also be collected. Plankton groups include: *Centric Diatoms, Pennate Diatoms, Other Dinoflagellates, Cyanobacteria, Ciliates, Other Zooplankton*. Group abundances include: None–Present–Abundant–Bloom. Within each group reported, there is the option to identify the most dominant species present (for example, Centric Diatoms–Abundant; *Coscinodiscus, Guinardia*)

To help with group identification, an ‘Other Phytoplankton ID assistance sheet’ was developed that separates centric and pennate diatom line drawings and also contains line drawings of dinoflagellates that may be found in the sample.

## UPS SAMPLE SHIPPING

**PRESERVING SAMPLES:** Use volume denoted on marked pipette. If noticeable color change (yellow-brown) does not occur, add more Lugol's. Record volume of Lugol's added on sample label.



### UPS NEXT DAY AIR SHIPMENTS (ship as soon as possible)

**NOTE:** shipment can be taken to a UPS operated store (see next page for details)

30mL bottle = 0.5mL Lugol's  
125mL bottle = up to 2.5mL Lugol's



- Preserve the 30mL whole water grab live and 125mL net tow samples
- Prepare the 1L whole water grab live and both the 30mL & 125mL preserved samples
- Tape around each bottle cap with electrical tape
- Fill out and attach sample label to each bottle
- Add 30mL & 125mL bottles to a slider zip bag

Package samples securely into UPS Express Pad Pak

- Fold Express Pad Pak in half or add packing material to eliminate empty space

Complete section one of red UPS Next Day Air pre-printed shipping document

In section three,  "PAK" and enter weight of the package to nearest pound

In section five,  "NEXT DAY AIR" and in section ten, sign name and enter date

» **After the package has been sent, email tracking number to the PMN**



### UPS GROUND SHIPMENTS (refer to UPS Ground Shipping Calendar)

**NOTE:** shipment can be taken to a UPS operated store or UPS Drop Box (see next page for details)

- 1<sup>st</sup> Full Week of the Month » Gulf Coast
- 2<sup>nd</sup> Week of the Month » Atlantic Regions 1 & 2
- 3<sup>rd</sup> Week of the Month » Atlantic Region 3
- 4<sup>th</sup> Week of the Month » Others



- ▲ Preserve and prepare the 30mL whole water grab live and 125mL net tow samples
- Tape around each bottle cap with electrical tape
- Fill out and attach sample label to each bottle
- Add bottles to a slider zip bag and store for shipment



- ◆ Preserve and prepare the 30mL whole water grab live sample
- Tape around bottle cap with electrical tape
- Fill out and attach sample label
- Add bottle to slider zip bag and store for shipment

Package sample(s) securely into 9" x 12" white poly mailer

- Fold poly mailer in half or add packing material to eliminate empty space

Complete section one of brown UPS Ground pre-printed shipping document

In section three, enter weight of the package to nearest pound

In section ten, sign your name and enter date



**PROBLEMS WITH UPS:** call PMN immediately. **Do not personally pay for UPS shipments, packing materials, and/or boxes.** Such expenses incurred by volunteers cannot be reimbursed.

**INVENTORY STATUS:** Please contact PMN directly if you are running low on supplies (labels, bottles, etc.) and we will send replacements.

***The GOAL is to keep the same  
HAB Screening supply inventory at all times.***

## UPS SHIPPING GUIDE



Shipping via UPS may not necessarily be "easy" for all volunteers. Below are descriptions of the different type of UPS facilities that may be in your area. Not all of them will accept the PMN pre-printed shipping documents that you have been provided to use for PMN shipments.

If you have shipped from a non-UPS operated store (the UPS Store, Staples, PakMail) in the past using PMN's account then there should be no problems using the pre-printed shipping document since that store has selected to accept this method of payment. However, officially non-UPS operated facilities do not have to take packages that are being billed to the receiver's account number (but will take packages that use the receiver's pre-paid label). Unfortunately the way the UPS account is structured, PMN is unable to create pre-paid labels. While the pre-printed shipping documents are great and convenient, they may NOT be accepted at ALL your local UPS shipping locations. The nearest place to you that does accept PMN shipments will have to be determined case by case, based on the individual franchise and/or non-UPS operated store.

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**UPS CUSTOMER CENTER:** 100% of these centers will accept the pre-printed shipping document for either UPS Ground or UPS Next Day Air.

**UPS DROP BOX:** 100% of drop boxes will accept the pre-printed shipping document. Drop boxes accept packages with a maximum size of 16" x 13" x 3"; therefore ONLY the PMN white poly mailer used for UPS Ground shipments will fit into the drop box (UPS Express Pad Pak with 1L bottle will NOT fit into the drop box). You can drop off your shipment 24 hours a day to a UPS drop box, but in extreme hot or cold weather please know when pickup normally takes place so the samples are not left in the extreme weather for more than a few hours.

**THE UPS STORE:** Are independently owned and operated UPS franchises. Whether or not they will accept the pre-printed shipping document (UPS Ground or UPS Next Day Air) is dependent on how that franchise is operated. *Call beforehand to inquire if they will accept a pre-printed shipping document billed to the receiver's UPS account* (NOTE: this is not a pre-paid label; nor is this being billed to the shipper's account. Stress that it is being billed to the receiver's account).

**UPS ALLIANCE LOCATIONS** (Staples, Office Depot) and **AUTHORIZED SHIPPING OUTLETS** (Pak Mail): Are independently owned and operated stores. Whether or not they will accept the pre-printed shipping document (UPS Ground or UPS Next Day Air) is dependent on how each individual store is operated. *Call beforehand to inquire if they will accept a pre-printed shipping document billed to the receiver's UPS account* (NOTE: this is not a pre-paid label; nor is this being billed to the shipper's account. Stress that it is being billed to the receiver's account).

**Call 800-742-5877 or visit [www.ups.com/dropoff/](http://www.ups.com/dropoff/) to find the UPS location nearest to you.**

## USE OF SAMPLES AT PMN LAB

When samples arrive at the PMN lab, the 125mL net tow preserved sample is first analyzed with a compound light microscope or inverted microscope to verify the presence of the organism(s) noted in the online data form.

Second, the 125mL net tow preserved sample is prepped for analysis using an advanced microscopy technique. For many target species this involves the use of the scanning electron microscope (SEM).

Third, the 30mL whole water grab preserved sample is enumerated (each cell being counted) using a Sedgewick-Rafter counting cell to produce cells/liter (cells/L) data.

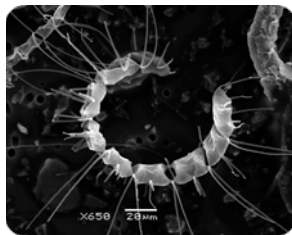
Finally, the 1L whole water grab live sample is filtered and if necessary, sent to the Analytical Response Team (ART) for toxin analysis.



### 125ML NET TOW PRESERVED SAMPLE & 30ML WHOLE WATER GRAB PRESERVED SAMPLE

The PMN lab uses light microscopy and various advanced microscopy techniques, including scanning electron microscopy, confocal microscopy, epi-fluorescence, DIC and phase contrast, to confirm species identification.

Micrographs are taken of species of interest. Below are examples of *Chaetoceros* micrographs using some of the different advanced microscopy techniques.



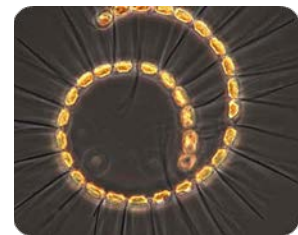
SEM



Epi-fluorescence



DIC



Phase Contrast

### 30ML WHOLE WATER GRAB PRESERVED SAMPLE



If necessary, the PMN lab enumerates the sample using an inverted light microscope and a Sedgewick-Rafter gridded counting cell. The count generates data in the unit, cells/L. PMN can then add the cells/L count to your data collection.

### 1L WHOLE WATER GRAB LIVE SAMPLE

The PMN lab filters 150mL - 400mL of the seawater sample onto a 47mm Whatman glass fiber filter to use for toxin analysis.

Toxin analysis is performed by the Analytical Response Team (ART) at the Charleston NOAA lab.

## DATA ENTRY

The data entry tool was designed to follow the information found on the datasheet. Enter data via the form at <http://products.coastalscience.noaa.gov/pmnscreening.aspx>. Keep a hard copy of the datasheet in your PMN folder. **REQUIRED** information must be entered to submit. **OPTIONAL** information can be entered based on available equipment, time and the depth of analysis desired.

### HAB Screening Data Sheet: Gulf of Mexico

Your Login ID: \_\_\_\_\_

#### Required

<p><b>Login ID</b> <input type="text" value="TX15"/></p> <p><b>Sampling Site</b> <input type="text" value="Port O'Connor Fishing Pier"/></p> <p><b>Sample Date</b> <input type="text" value="05/23/2012"/></p> <p><b>Sample Time</b> <input type="text" value="1225"/></p> <p><b>Water Temp (°C)</b> <input type="text" value="30"/></p> <p><b>Air Temp (°C)</b> <input type="text" value="31"/></p> <p><b>Salinity (ppt)</b> <input type="text" value="27"/></p> <p><b>Akashiwo sanguinea</b> <input type="text" value="No"/></p> <p><b>Alexandrium monilatum</b> <input type="text" value="No"/></p> <p><b>Ceratium furca</b> <input type="text" value="Yes"/></p> <p><b>Chaetoceros spp.</b> <input type="text" value="Elevated"/></p> <p><b>Prorocentrum spp.</b> <input type="text" value="Yes"/></p> <p><b>Pseudo-nitzschia spp.</b> <input type="text" value="Yes"/></p> <p><b>Pyrodinium bahamense</b> <input type="text" value="No"/></p> <p><b>Other Elevated/Bloom Species</b> <input type="text"/></p>	<p>» Login ID is assigned to each volunteer</p> <p>» Enter your sampling site name</p> <p>» Enter date as MM/DD/YYYY</p> <p>» Enter time in 24-hr format</p> <p>» Enter temperature to nearest 1°C <b>REMINDER: Only Water Temperature Required</b></p> <p>» Enter salinity to nearest 1ppt</p> <p>» Default is set to NO</p> <p>» Change to YES or ELEVATED for any <b>TARGET SPECIES</b> found in the sample</p> <p>» Enter the name of any non-target species in elevated/bloom status</p>
<b>Optional</b>	
<p><b>Weather</b> <input type="text" value="Partly Cloudy"/></p> <p><b>Wind direction</b> <input type="text" value="Choose one"/></p> <p><b>Wind speed (mph)</b> <input type="text" value="Choose one"/></p> <p><b>Tides</b> <input type="text" value="High"/></p> <p><b>pH</b> <input type="text"/></p> <p><b>Dissolved Oxygen (ppm)</b> <input type="text"/></p> <p><b>Barometric pressure (mmHg)</b> <input type="text"/></p> <p><b>Secchi Disk (cm)</b> <input type="text"/></p> <p><b>Centric Diatoms</b> <input type="text" value="None"/></p> <p><b>Pennate Diatoms</b> <input type="text" value="Abundant"/> <input type="text" value="Navicula, Thalassionema"/></p> <p><b>Dinoflagellates</b> <input type="text" value="None"/></p> <p><b>Cyanobacteria</b> <input type="text" value="None"/></p> <p><b>Ciliates</b> <input type="text" value="Choose one"/></p> <p><b>Other Zooplankton</b> <input type="text" value="Present"/></p> <p><b>Comments</b> <input type="text"/></p>	<p>» If measuring optional parameters, select from list</p> <p>» If measuring optional parameters, enter data</p> <p>» If entering optional plankton communities, OPTIONS: No – YES – Elevated</p> <p>» If entering optional plankton communities, can enter the name of the dominant species » But is not required</p> <p>» Default is set to CHOOSE ONE</p> <p>» Special comments or observations from that sample: odors, odd water color, dead fish, unusual conditions, etc.</p> <p>» SUBMIT – Sends data in form of an email to PMN</p>
<p><input type="button" value="Submit"/> <input type="button" value="Cancel"/></p>	

## **SAFETY**

### **BASIC SAFETY**

The most important part to volunteering with the PMN is safety. If weather conditions are such that collecting the samples might cause injury or illness, reschedule your sampling for later in the week or at another time. Remember to dress appropriately for the current weather and be prepared for unexpected bad weather. If sampling from a dock be sure to wear appropriate footwear to reduce risk of falling and always be sure to steady yourself when working near the edge of water. If sampling from a boat, be sure to follow all federal and state safety procedures.

### **TOXIC AEROSOLS**

Brevetoxin aerosols are produced by *Karenia brevis*, a potentially toxic dinoflagellate found in the Gulf of Mexico and southeastern Atlantic. Wave action breaks the athecate cell dispersing brevetoxin in the air. Human symptoms of aerosolized brevetoxin exposure include difficulty breathing and acute eye irritation. Avoid high-risk areas when blooms are occurring.

### **VIBRIO INFECTIONS**

[www.vdh.virginia.gov/epidemiology/DEE/Waterborne/skininfections.htm](http://www.vdh.virginia.gov/epidemiology/DEE/Waterborne/skininfections.htm)

*Vibrio* bacteria are naturally occurring marine organisms that reach high numbers during the summer months in coastal waters of the United States. *Vibrio* is a group of bacteria that may cause illness in people and some types of *vibrio* bacteria found in salt water may cause skin infections.

#### **How do you get skin infections from *vibrio* bacteria?**

People become infected when water containing *vibrio* bacteria comes into contact with cuts or open sores on skin. *Vibrio* bacteria may be found in coastal waters, including the Chesapeake Bay, where people swim and fish. *Vibrio* bacteria that cause skin infections do not spread from one person to another.

#### **What does skin infected with *vibrio* bacteria look like?**

Open round sores (ulcers) may appear on skin infected with *vibrio* bacteria. The skin may also become red and puffy (cellulitis).

#### **Can a person with a *vibrio* bacteria skin infection have other signs of illness?**

Yes. A person may have a fever. If untreated, the infection may spread to a person's bloodstream. People with weak immune systems have a greater risk of infection spreading beyond skin.

#### **How are *vibrio* bacteria skin infections treated?**

*Vibrio* bacteria skin infections are treated with antibiotics. Telling your doctor about swimming or fishing in coastal water may help him/her treat the infection properly.

#### **How can *vibrio* bacteria skin infections be prevented?**

The best way to prevent *vibrio* skin infections is to stay out of coastal waters and avoid contact of cuts, burns or sores with coastal waters by wearing gloves during sampling. Even when wearing gloves, make sure to thoroughly wash hands immediately after sampling (this may require you to bring hand washing supplies with you). People with weak immune systems should be especially careful to take precautions when coming into contact with water that may contain *vibrio* bacteria.

#### **Do other organisms found in water cause skin infections?**

Yes. Many other types of organisms found in water and animals that live in water may cause skin infections in people. In most cases, the best way to prevent other infections is to stay out of the water if you have open cuts or sores on skin.





# Phytoplankton Monitoring Network

Promoting a better understanding of Harmful Algal Blooms by way of Volunteer Monitoring

## Basic Morphological Terminology of Phytoplankton

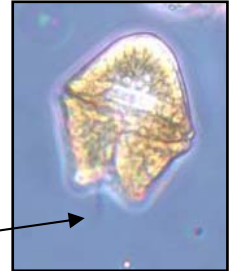
### Bilobed

*Dinoflagellates* –  
divided into two lobes



### Flagella (p)

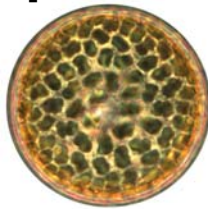
*Dinoflagellates* –  
whip-like structures used  
primarily for locomotion



Flagellum (s)

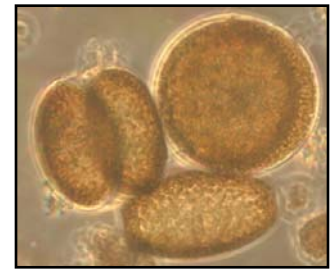
### Centric [Taxonomic Order]

*Diatoms* –  
valve striae arranged in  
relation to a point or  
central areola; often round  
or circular



### Frustule

*Diatoms* –  
siliceous parts of  
the cell wall or  
skeleton



### Chain

*Phytoplankton* –  
of the same species  
linked together



### Nucleus

*Phytoplankton* –  
organelle in eukaryotic cells containing  
most of the cell's genetic material



### Peduncle

*Heterotrophic Dinoflagellates* –  
mouth used for engulfing food

### Chloroplasts

*Phytoplankton* –  
organelles in the cytoplasm  
that contain cell pigments



### Pennate [Taxonomic Order]

*Diatoms* –  
longitudinally symmetric

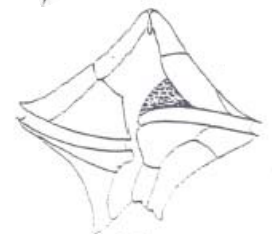


### Eyespot

*Dinoflagellates* –  
red spot involved in light perception

### Plated

*Some Dinoflagellates* –  
armored plates  
composed of cellulose  
found in the cell wall





# Phytoplankton Monitoring Network

Promoting a better understanding of Harmful Algal Blooms by way of Volunteer Monitoring

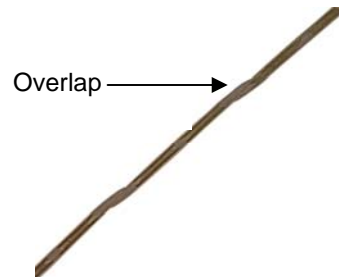
## Process

*Diatoms* - an oriented projection of a silicate cell wall



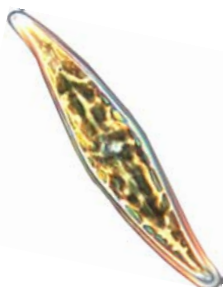
## Stepped chain

*Diatoms* - organism linked together to form a series of steps



## Raphe

*Pennate Diatoms* - longitudinal fissure associated with and involved in gliding locomotion



## Theca

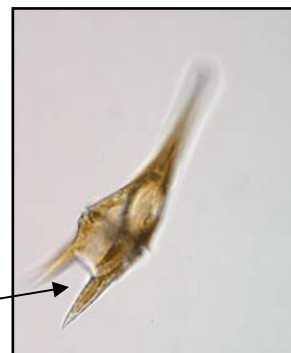
*Dinoflagellates* - a multiple membrane complex with vesicles and some species with scales, composed of cellulose

## Segmented

*Diatoms* - separation of the main body into sections, may be equal or unequal

## Trough

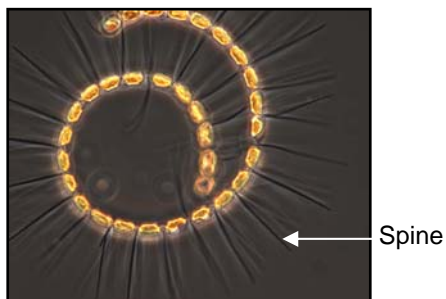
*Dinoflagellates* - depression in the main body of the cell



## Spines

*Diatoms* - closed or solid structures projecting from the cell wall

*Dinoflagellates* - solid protuberances that usually taper to a point



*Pleurosigma*

*Bacteriastrum*

*Protoperidinium*

**Phytoplankton**

*Ceratium fusus*

*Coscinodiscus*

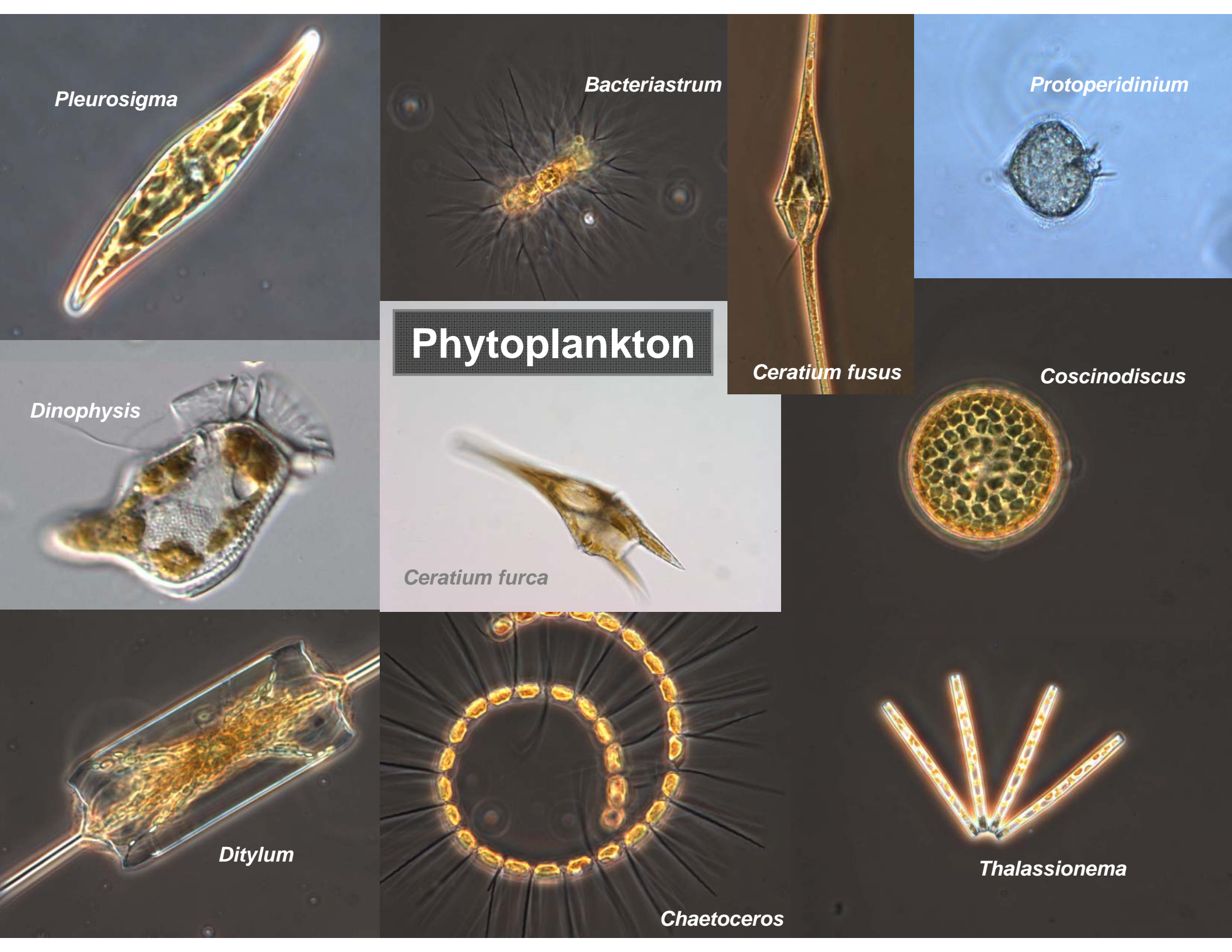
*Dinophysis*

*Ceratium furca*

*Ditylum*

*Chaetoceros*

*Thalassionema*





Gastropod Veliger



Copepod



Brittle Star Larvae



Starfish Larva



Barnacle Larva



Clam Larva



Portuguese Man of War



Tintinnid

# Zooplankton



Crab Zoea



Polychaete Worm



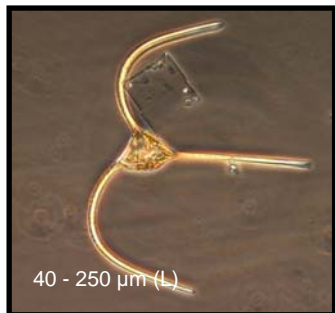
Jellyfish



## ID SHEET

### ■ DINOFLAGELLATES

*Ceratium longipes* morphotype



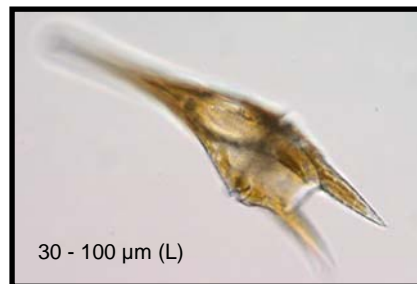
40 - 250  $\mu\text{m}$  (L)

*Ceratium fusus* morphotype



200 - 1000  $\mu\text{m}$  (L)

*Ceratium furca* morphotype



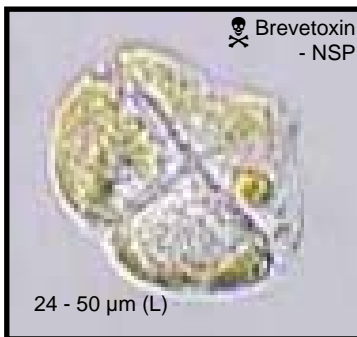
30 - 100  $\mu\text{m}$  (L)

*Dinophysis* spp.



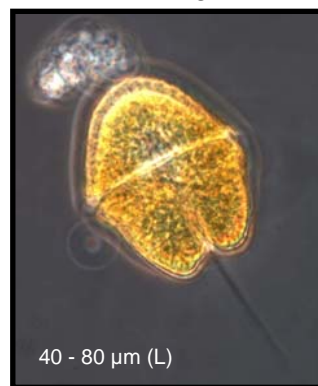
15 - 100  $\mu\text{m}$  (L)

*Karenia brevis*



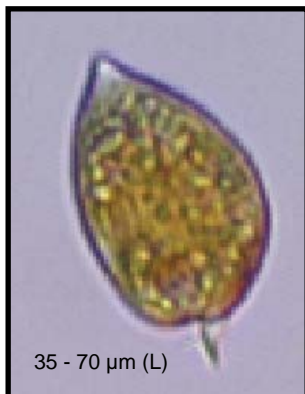
24 - 50  $\mu\text{m}$  (L)

*Akashiwo sanguinea*



40 - 80  $\mu\text{m}$  (L)

*Prorocentrum micans*



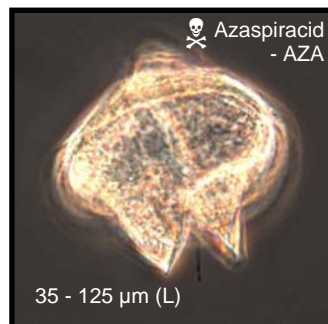
35 - 70  $\mu\text{m}$  (L)

*Prorocentrum lima*



30 - 50  $\mu\text{m}$  (L)

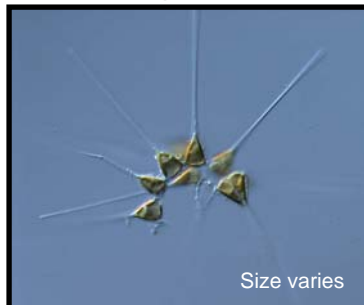
*Protoperidinium* spp.



35 - 125  $\mu\text{m}$  (L)

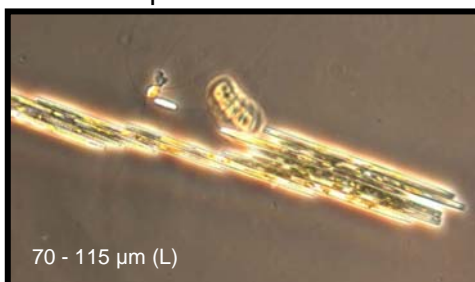
### ■ DIATOMS

*Asterionellopsis* morphotype



Size varies

*Bacillaria* sp.



70 - 115  $\mu\text{m}$  (L)

*Chaetoceros* spp.



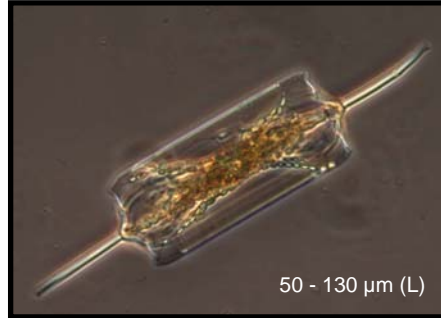
Size varies

# ■ DIATOMS

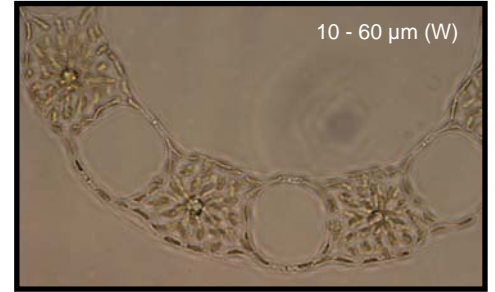
*Coscinodiscus* morphotype



*Ditylum* spp.



*Eucampia* spp.



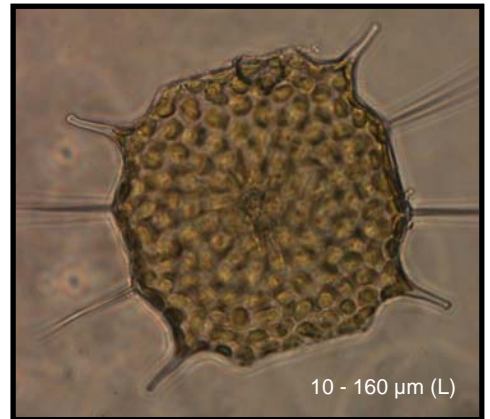
*Guinardia* spp.



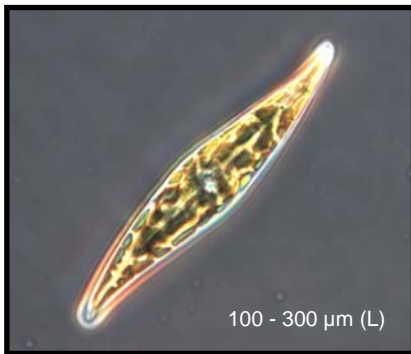
*Nitzschia* morphotype



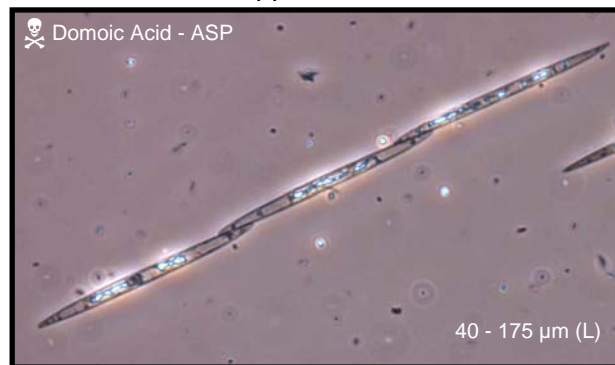
*Odontella* spp.



*Pleurosigma* morphotype



*Pseudo-nitzschia* spp.



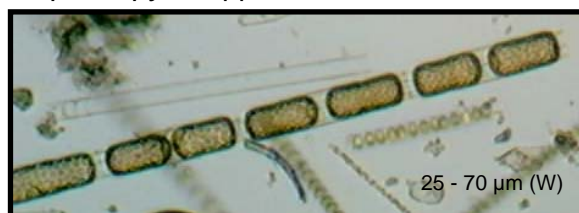
*Rhizosolenia* morphotype



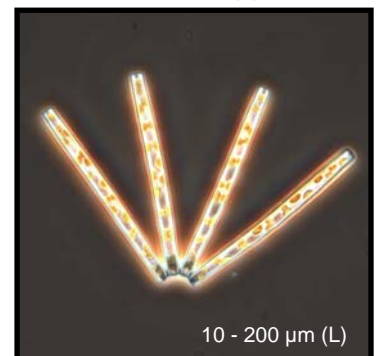
*Skeletonema* spp.



*Stephanopyxis* spp.



*Thalassionema* spp.





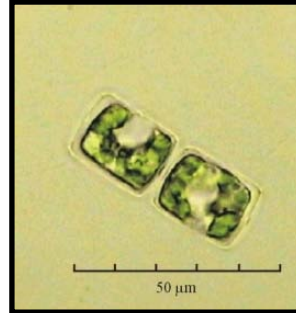
# ID SHEET

## DIATOMS (CONTINUED)

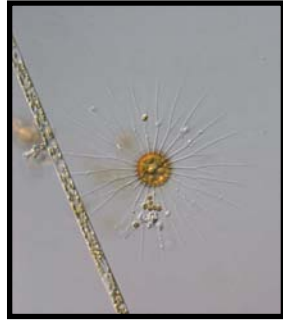
*Entomoneis* spp.



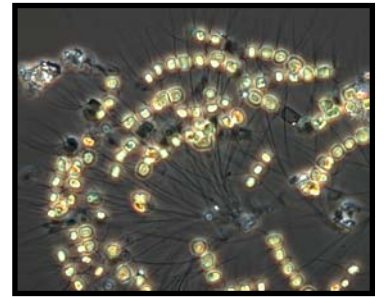
*Bacterosira* sp.



*Bacteriastrum* spp.



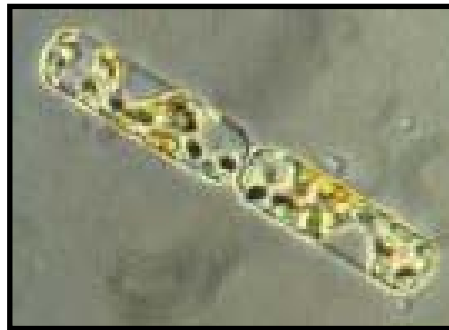
*Chaetoceros socialis*



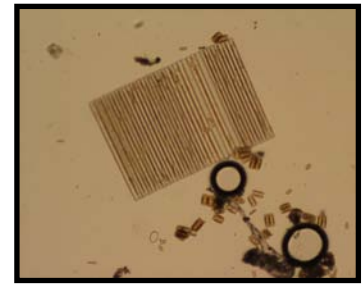
*Corethron* spp.



*Dactyliosolen* spp.



*Fragilariopsis* spp.



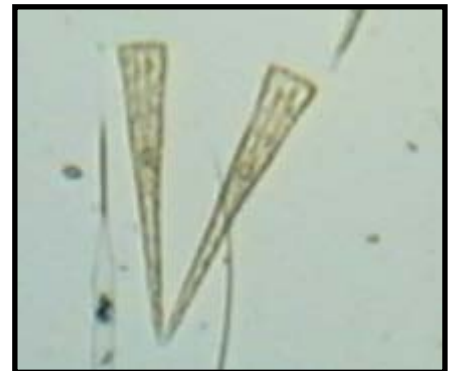
*Hemiaulus* spp.



*Leptocylindrus* spp.



*Licmophora* spp.



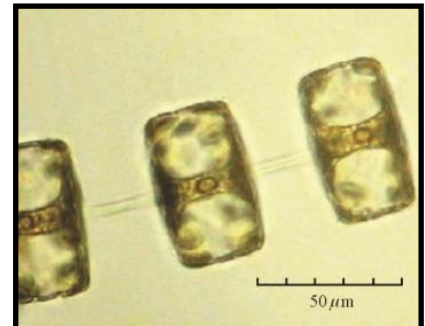
*Melosira* spp.



*Navicula* morphotype



*Thalassiosira* spp.



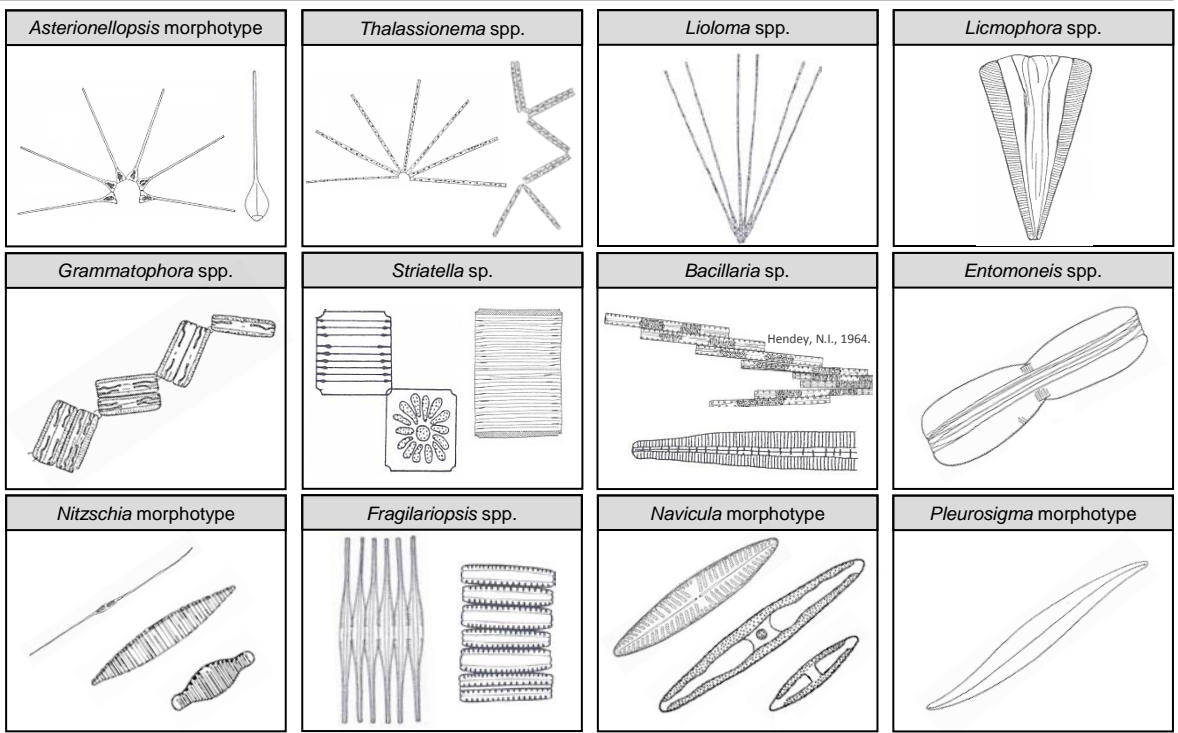
# PENNATE DIATOMS

## ORDER PENNALES

Illustrations NOT to Scale:

Cupp, E.E., 1943. Marine Plankton Diatoms of the West Coast of North America, University of California Berkeley.

Tomas, C. (Ed.), 1997. Identifying Marine Phytoplankton. San Diego, CA.



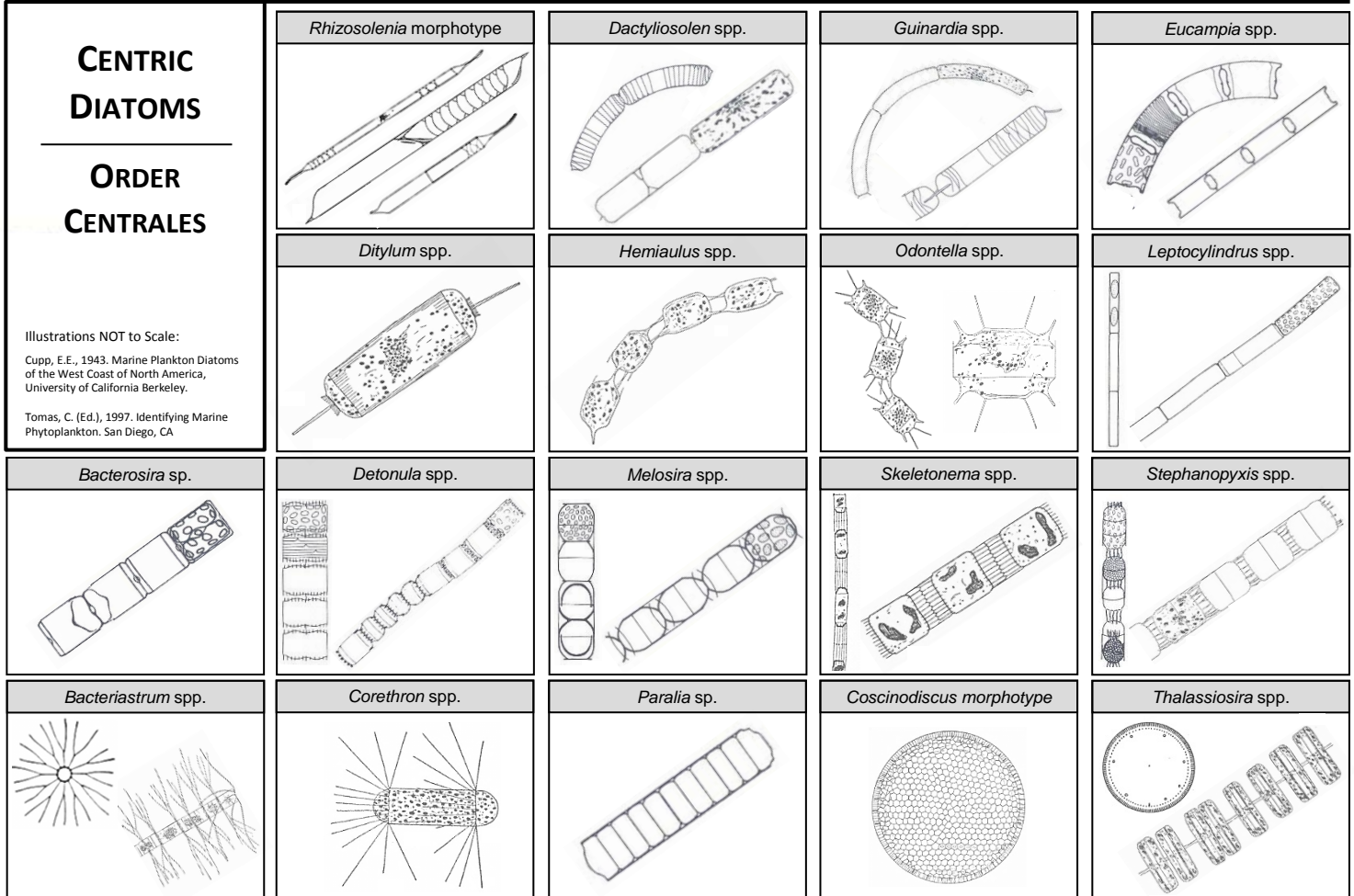
# CENTRIC DIATOMS

## ORDER CENTRALES

Illustrations NOT to Scale:

Cupp, E.E., 1943. Marine Plankton Diatoms of the West Coast of North America, University of California Berkeley.

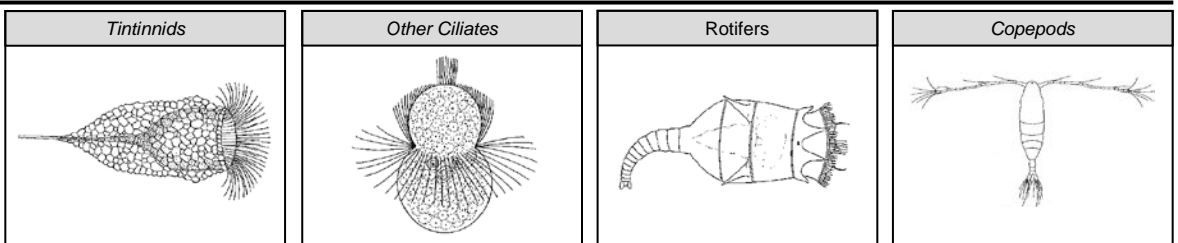
Tomas, C. (Ed.), 1997. Identifying Marine Phytoplankton. San Diego, CA



# ZOOPLANKTON

Illustrations NOT to Scale:

Johnson, W.S., Allen, D.M., 2005. Zooplankton of the Atlantic and Gulf Coasts A Guide to Their Identification and Ecology. Baltimore, Maryland.





**DINOFLAGELLATES**

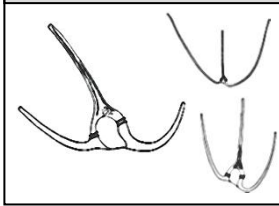
**ORDER GONYAULACALES**

Illustrations NOT to Scale:  
 Tomas, C. (Ed.), 1997. Identifying Marine  
 Phytoplankton. San Diego, CA.

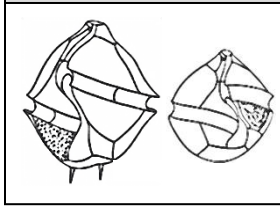
*Ceratium fusus* morphotype



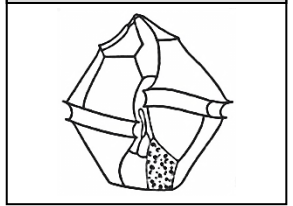
*Ceratium longipes* morphotype



*Gonyaulax* spp.



*Lingulodinium polyedrum*

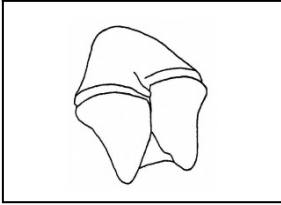


**DINOFLAGELLATES**

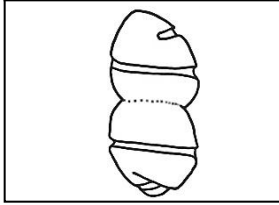
**ORDER GYMNODINIALES**

Illustrations NOT to Scale:  
 Tomas, C. (Ed.), 1997. Identifying Marine  
 Phytoplankton. San Diego, CA.

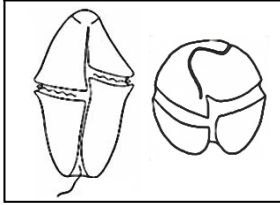
*Akashiwo sanguinea*



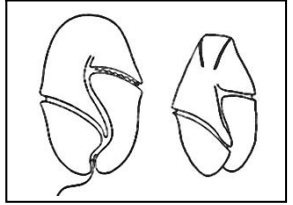
*Cochlodinium* spp.



*Gymnodinium* morphotype



*Gyrodinium* morphotype

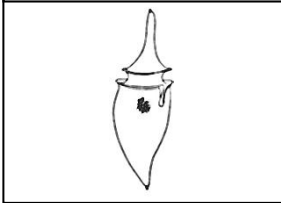


**DINOFLAGELLATES**

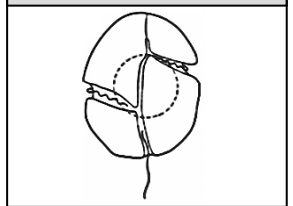
**ORDER DINOPHYSIALES**

Illustrations NOT to Scale:  
 Tomas, C. (Ed.), 1997. Identifying Marine  
 Phytoplankton. San Diego, CA.

*Oxyphysis* sp.



*Karlodinium* spp.

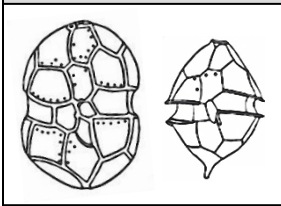


**DINOFLAGELLATES**

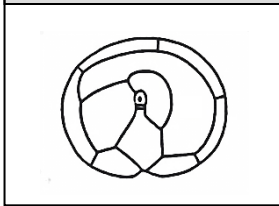
**ORDER PERIDINIALES**

Illustrations NOT to Scale:  
 Tomas, C. (Ed.), 1997. Identifying Marine  
 Phytoplankton. San Diego, CA.

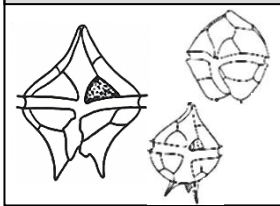
*Heterocapsa* spp.



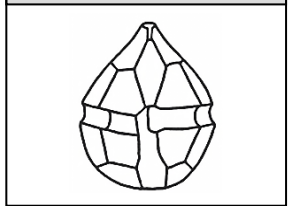
*Oblea* sp.



*Protoperidinium* spp.



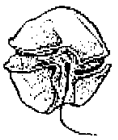
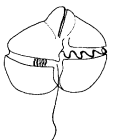
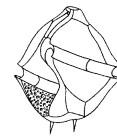
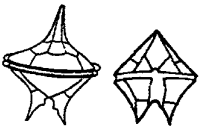
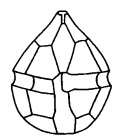


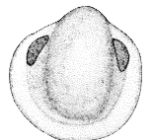



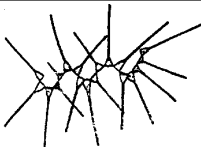
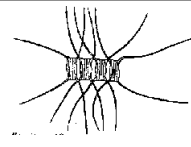

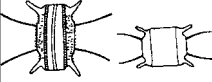

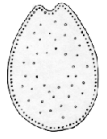
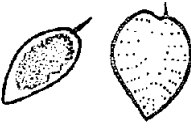




















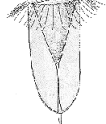
*Scrippsiella* spp.



# Target Species

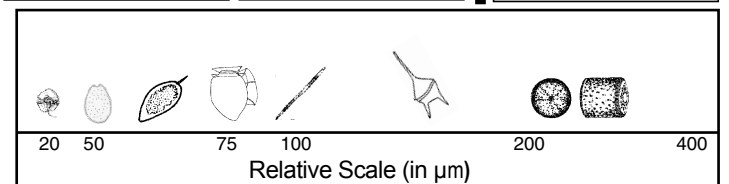
# COMMON PHYTOPLANKTON KEY

# OTHER COMMON PLANKTON (non-phyto)

<i>Alexandrium</i> spp. AL  25-46 µm	<i>Gymnodinium</i> spp. GY  24-50 µm	<i>Gonyaulax spinifera</i> GS  25-50 µm	<i>Protoperidinium</i> spp. PT  50-95 µm	<i>Scropsiella</i> spp. SC  20-37 µm	<i>Coccinodiscus</i> spp. CO  40-500 µm	<i>Odontella</i> spp. OD  45-70 µm	<i>Larval Clam</i> LC  Generally Large
<i>Dinophysis norvegica</i> DN  48-80 µm	<i>Dinophysis acuminata</i> DA  40 - 50 µm	<i>Dinophysis tripos</i> DT  40 - 120 µm	<i>Asterionellopsis</i> spp. AS  30-150 µm	<i>Chaetoceros</i> spp. CH  10 - 53 µm	<i>Chaetoceros socialis</i> CS  3-15 µm	<i>Biddulphia</i> spp. BD  60 - 160 µm	<i>Rotifer</i> spp. RO  Generally Large
<i>Prorocentrum lima</i> PL  31-47 µm	<i>Prorocentrum micans</i> PM  35-70 µm	<i>Ceratium fusus</i> CF  200-540 µm	<i>Ceratium lineatum</i> CL  100-130 µm	<i>Ceratium longipes</i> CP  150-250 µm	<i>Dictyocha</i> spp. DO  10-45 µm	<i>Fragilaria</i> spp. FR  10 - 70 µm	<i>Pollen Grain</i> PG  Generally Large
<i>Pseudonitzschia</i> PS  64-117 µm	<i>Thalassionema</i> spp. TA  16 - 90 µm	<i>Thalassiosira</i> spp. TL  12-39 µm	<i>Nitzschia</i> spp. NZ  60 - 125 µm	<i>Skeletonema</i> spp. SK  2-21 µm	<i>Ditylum</i> spp. DM  80 - 130 µm	<i>Leptocylindrus</i> spp. LP  30 - 75 µm	<i>Crab Zoa</i> CZ  Generally Large
<i>Species Name</i> CODE (Guide to using key) illustration of organism Size Range ( in µm)	<i>Rhizosolenia</i> spp. RH  25-57 µm	<i>Gyrosigma</i> spp. GY  110 - 175 µm	<i>Navicula</i> spp. NV  32-49 µm	<i>Melosira</i> spp. ML  10-50 µm	<i>Guinardia</i> spp. GN  60 - 160 µm	<i>Eucampia</i> spp. EU  10-33 µm	<i>Tintinnid</i> spp. TN  Generally Large

## REFERENCES USED

Cupp, E.E. 1943. Marine Plankton Diatoms of the West Coast of North America, University of California Berkeley  
 McConnaughey, B.H. 1970. Introduction to Marine Biology. C.V. Mosby St. Louis  
 Smith, D.L., 1997. A Guide to Marine and Coastal Plankton and Marine Invertebrate Larvae; Kendall/Hunt Dubuque.  
 Tomas, C.R. 1997. Identifying Marine Phytoplankton. Academic Press/Harcourt Brace San Diego.  
 van den Hoek, C., Mann D.G. & Jahns, H.M. 1993. Algae; an introduction to phycology. Cambridge University Press.  
<http://www.marbot.gu.s/SSS/SSSHome.htm>





## UPS Ground Shipping Calendar for $\Delta$ or $\diamond$

*Prior to shipping, please follow the steps below:*

- tape bottle cap closed
- attach completed sample label
- place in slider zip bag or other zip top bag
- pack securely in 9" x 12' white poly mailer

# 2019

## PMN shipping calendar

January						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

February						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

March						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
						31

April						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
						30

July						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

November						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Gulf of Mexico  
 Atlantic 1 & 2  
 Atlantic 3; Tropics  
 All other regions



## PRODUCT NAME: Lugol's Solution

### SECTION I

<b>Manufacturer's Name</b> Phytoplankton Monitoring Network (PMN)	<b>Emergency Telephone Number</b> (843) 762-8857
<b>Address</b> Phytoplankton Monitoring Network c/o Steve Morton, Ph.D. Hollings Marine Laboratory 331 Fort Johnson Road Charleston, S.C. 29412-9110	<b>Telephone Number for Information</b> (843) 762-8857
	<b>Date Prepared</b> August 11, 2006
	<b>Signature of Preparer (optional)</b>

### SECTION II – COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient Name	CAS #	TLV Units	Percent (%)
Iodine	7553-56-2	STEL: 01 ppm	5
Potassium Iodide	7681-11-0	None established	10
Water	7732-18-5	None established	84
Glacial Acetic Acid *	64-19-7	STEL: 15 ppm 8h TWA: 8 ppm	* negligible amount added

### SECTION III – PHYSICAL/CHEMICAL CHARACTERISTICS

<b>Boiling Point</b>	100 °C	<b>Specific Gravity (H<sub>2</sub>O = 1)</b>	> 1
<b>Vapor Pressure (mm Hg)</b>	N/A	<b>Melting Point</b>	N/A
<b>Vapor Density (Air = 1)</b>	N/A	<b>Evaporation Rate (Butyl Acetate = 1)</b>	N/A
<b>Solubility in Water</b>	Complete		
<b>Appearance and Odor</b>	Dark amber (brown) liquid. Iodine odor.		

### SECTION IV – FIRE AND EXPLOSION HAZARD DATA

<b>Flash Point</b>	N/A	<b>Flammable Limits</b>	N/A	<b>LEL</b>	N/A	<b>UEL</b>	N/A
<b>Extinguishing Media</b>	Use extinguishing media appropriate to surrounding fire.						
<b>Special Fire Fighting Procedures</b>	Use dry chemical CO <sub>2</sub> , alcohol foam or water spray. Wear an approved self-contained breathing apparatus and full protective clothing.						
<b>Unusual Fire and Explosion Hazards</b>	N/A						
<b>Firefighting</b>	Protective Equipment: wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.						

### SECTION V – STABILITY AND REACTIVITY DATA

<b>Stability</b>	<b>Unstable</b>	<b>Conditions to Avoid</b>	Direct light and heat; Incompatible materials
	<b>Stable</b>		
<b>Incompatibility (Materials to Avoid)</b>	Gaseous ammonia, acetaldehyde, sodium azide, sodium hydride, other reducing agents		
<b>Hazardous Decomposition or Byproducts</b>	Hydrogen iodide, iodine, potassium oxides		
<b>Hazardous Polymerization</b>	<b>May Occur</b>	<b>Conditions to Avoid</b>	N/A
	<b>Will Not Occur</b>		

## SECTION VI – HEALTH HAZARD DATA

<b>Route(s) of Entry:</b>	<b>Inhalation?</b> YES	<b>Eye?</b> YES	<b>Skin?</b> YES	<b>Ingestion?</b> YES
<b>Health Hazards</b>				
<b>Inhalation</b>	May cause respiratory tract irritation.			
<b>Eye</b>	May cause eye irritation.			
<b>Skin</b>	Mild irritation and brown staining.			
<b>Ingestion</b>	May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause gastric disturbances and electrolytic imbalance.			
<b>Carcinogenicity:</b>	NO			
<b>Teratogenicity:</b>	Potassium iodide has been observed to cause developmental abnormalities of the endocrine system in human fetuses.			
<b>Signs and Symptoms of Exposure</b>	May cause "red eye" with tearing headaches and rash.			
<b>Medical Conditions</b>	Generally aggravated by exposure. May aggravate lung and heart disease.			
<b>Emergency and First Aid Procedures</b>				
<b>Eye Contact</b>	Flush with running water for at least 15 minutes, keeping eyelids open. Get medical aid.			
<b>Skin Contact</b>	Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Get medical aid if irritation develops or persists.			
<b>Inhalation</b>	Remove to fresh air. If not breathing, give artificial respiration. Get medical aid if cough or other symptoms appear.			
<b>Ingestion</b>	Call Poison Control Center immediately.			

## SECTION VII – PRECAUTIONS FOR SAFE HANDLING AND USE

<b>Steps to Be Taken in Case Material is Released or Spilled</b>	Clean spills immediately wearing the proper PPE (section VIII). Dilute with water and absorb with sand or dry inert material.
<b>Waste Disposal Method</b>	Sweep or scoop into a closed container, ventilate area and wash spill site after material pickup is complete. Observe all federal, state and local environmental regulations.
<b>Precautions to Be Taken in Handling and Storing</b>	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Store in cool, dry, dark, well-ventilated area, away from incompatible materials.
<b>Other Precautions</b>	N/A

## SECTION VIII – CONTROL MEASURES

<b>Respiratory Protection</b>	Government approved respirator		
<b>Ventilation</b>	<b>Local Exhaust</b>	YES	<b>Special</b> N/A
	<b>Mechanical (General)</b>	YES	<b>Other</b> N/A
<b>Protective Gloves</b>	Compatible chemical-resistant gloves	<b>Eye Protection</b>	Chemical safety goggles (OSHA 29 CFR 1910.133)
<b>Other Protective Clothing or Equipment</b>	Wear appropriate protective clothing to prevent skin exposure.		
<b>Work/Hygienic Practices</b>	N/A		
<b>Exposure Limits</b>	No OSHA vacated PELs are listed for iodine, potassium iodide, and water; No TLVs are established for this solution (ACGIH 2001).		