

Quality Assurance Project Plan

Tahoe Keys Lagoons Aquatic Weed Control Methods Test



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Quality Assurance Project Plan Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Submitted to:

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- A. Contractor Contact Information
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- C. Map of CMT Sites
- D. BMPs for Selected Actions
- E. Daily Log Form (Template)
- F. Herbicide Application Schedule
- G. Spill Prevention and Response Plan
- H. Summary Monitoring Actions
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- J. Lanthanum Modified Clay Application Plan (LMCAP)
- K. Notifications (Homeowners)
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- M. CMT Sample Station ID Codes
- N. Data Storage and Backup Sites
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- P. Contractor Documents
- Q. Amendment for CMT Year 2 and 3

ACRONYMS AND ABBREVIATIONS

AA	Antidegradation Analysis
ADCP	Acoustical Doppler Current Profiler
AIP	Aquatic Invasive Plants
CEQA	California Environmental Quality Act
COC	chain of custody
CSI	Compliance Services International
DI	Deionized water
DO	dissolved oxygen
DOC	dissolved organic carbon
DQO	data quality objective
ELAP	Environmental Laboratory Accreditation Program
ESA	Environmental Science Associates
GW	groundwater
HAB	harmful algal bloom
HDPE	High Density Polyethylene
IEC/IS	Initial Environmental Checklist and Initial Study
LCS	laboratory control sample
LED	light-emitting diode
LIMS	laboratory information management system
LRWQCB	Lahontan Regional Water Quality Control Board
MQO	measurement quality objective
MS	matrix spike
MSD	matrix spike duplicate
mg/L	milligrams per liter
µg/L	micrograms per liter
NIST	National Institute of Standards and Technology
NTU	nephelometric turbidity units
ONRW	Outstanding National Resource Water
ORP	oxidation reduction potential
PAR	Photosynthetically Active Radiation
PVC	polymerizing vinyl chloride
QAPP	Quality Assurance Project Plan
RL	reporting limit
RPD	relative percent difference
SAV	Submersed Aquatic Vegetation
SW	surface water
SWAMP	Surface Water Ambient Monitoring Program
TRC	TRC Environmental Corporation
TKLRP	Tahoe Keys Lagoons Restoration Program
TKN	total Kjeldahl nitrogen
TKPOA	Tahoe Keys Property Owners Association
TRPA	Tahoe Regional Planning Agency
USEPA	United States Environmental Protection Agency
WETLAB	Western Environmental Testing Laboratory

1.0 PROJECT ORGANIZATION AND DISTRIBUTION LIST

1.1 Key Individuals, Certification Requirements, and Responsibilities

This Quality Assurance Project Plan (QAPP) is to support the Tahoe Keys Property Owners “Control Methods Test” (CMT) that is designed to provide data on the effectiveness and utility of separate and combined methods for control of aquatic vegetation (aquatic weeds) in the Tahoe Keys lagoons.

The following key individuals have lead responsibilities for implementing this QAPP:

Primary Contacts (Management and Oversight)

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- Dennis Zabaglo: Contract manager, TRPA
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Contractors who provide specific services as part of implementation of the CMT are listed below. Contractor Contact Information is in Attachment A.

TKPOA Contractors

- Stratus Environmental Inc.
 - Well Water Monitoring
 - Environmental Program Manager for Spill Prevention and Response
- AquaTechnex
 - Herbicide and Rhodamine Water Tracer (RWT) Dye Application
 - Lanthanum Modified Clay (LMC) Application and Monitoring
- Mountain Pipeline/Pacific Built
 - Culvert Seals
 - Culvert Pump and Pipe Socks
- Hiuga Divers
 - Turbidity Curtain Install and Removal
 - DASH (Diver Assisted Suction Harvesting)
- Shoreline Engineering
 - Installation of Boat Barriers
- Clean-Flo (Restorative Lake Sciences LLC)

- Laminar Flow Aeration
- Sierra Ecosystem Associates
 - CMT Project Management
- Tahoe Keys Property Owners Association
 - Standard (sonde) Water Quality Monitoring
 - On-water Support to Contractors
 - Homeowner Communications

TRPA Contractors

- Blankinship & Associates, Inc.
 - Herbicide & RWT Dye Monitoring
 - Laboratory Services – Herbicide Residues/Degradants
- Environmental Science Associates (ESA)
 - Nutrient Grab Water Quality Monitoring
 - Benthic Macroinvertebrate (BMI) Monitoring
 - Macrophyte Monitoring
 - Lanthanum Modified Clay (LMC) – Lab Coordination
- Stratus Environmental Inc.
 - Logger Downloads Water Quality (miniDOTs)
- Inventive Resources, Inc. (IRI)
 - UV-C Treatment Boats and Treatments
- Lahontan Water Board
 - Lab Services for TKPOA Cyanobacteria analyses and Split Samples

1.2 Distribution List

The following individuals will receive copies of this QAPP and any subsequent revisions:

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Contractors who have responsibilities for
performing specific scopes of work and related
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(See list in Attachment A)

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2.0 PROBLEM DEFINITION AND BACKGROUND

The Tahoe Keys Property Owners Association (TKPOA) submitted an application to conduct the Control Methods Test (CMT) a part of a request for a Lahontan Water Board “Basin Plan Exemption” (BPE) to the prohibition of using aquatic pesticides in Lake Tahoe. The Lahontan Water Board on January 13th, 2022 approved the requested BPE, and related EIR/EIS documents, and provided an Order (R6T-2022-0004) allowing the use of specified aquatic herbicides as part of the CMT. The NPDES permit (No. CA62022021 and Order R6T-2022-0004) also included specific Monitoring and Reporting Plan requirements, and additional information (BMPs and “final” site/map/ herbicide use) reflected in this QAPP). On January 26, 2022, The Tahoe Regional Planning Agency (TRPA) also approved the CMT and related EIR/EIS documents, and provided a TRPA Environmental Improvement Program (EIP) permit (TRPA Project 510-101-00; File No. EIPC2018-0011)

2.1 Site Background and Description

The CMT Project Area is located in the Tahoe Keys development, a 372-acre multi-use area located in South Lake Tahoe along the southern shore of Lake Tahoe, California. There are three sections or areas that comprise the Tahoe Keys waterways: The West Lagoon, the East (Marina) Lagoon and Lake Tallac (Figure 2-1). The Tahoe Keys development occurred in the 1960’s by excavating the lagoons and capping the soil with sand to form building sites (TKPOA 2018a). Within the current Keys development, there are 1,529 detached homes and townhomes as well as a commercial marina (in the Marina Lagoon), and a commercial center adjacent to the Marina Lagoon.

Access to the waterways is through two channels both of which are delineated by steel bulkheads: West Channel connects Lake Tahoe with the West Lagoon; and East Channel connects Lake Tahoe with the Marina Lagoon. These two channels are the only navigable passages between Lake Tahoe and the West Lagoon and Marina Lagoon. There is no navigable connection between Lake Tahoe and Lake Tallac, or between Lake Tallac and the West Lagoon or Marina Lagoon. Thus, Lake Tallac is mainly an isolated body of water that receives seasonal stormwater runoff from rain and snow melt from nearby City

of South Lake Tahoe neighborhoods. It has hydrologic connections to Pope Marsh (typically seasonally) and may (seasonally) connect with the West Lagoon via a gated diversion structure. The West Lagoon and Lake Tallac are further divided by the temporary installation of double turbidity curtains that separate herbicide-treated sites from the rest of the West Lagoon and untreated areas of Lake Tallac: A, B, C (Figure 2-1)

The Tahoe Keys lagoons have a maximum depth of about 25 feet, which occurs in a localized area immediately south of the West Channel. Typical depths throughout most of the lagoon fluctuate approximately 5 to 12 feet between wet and drought years. (For example, depths in 2021 and 2022 have been very low ranging from 3 ft to 10 ft.) During the warmer months the lagoons heat up and, in the winter, they often freeze, unlike Lake Tahoe and the East and West Channels, which do not freeze. The waters of the lagoons are consistently much more turbid than the clear waters of Lake Tahoe. This is due to the fine and unconsolidated bottom sediments, coupled with shallow water. Thus, although the Keys Lagoons have been included as part of the EPA/ONRW designation for Lake Tahoe, the Keys waterways present few of the special conditions attributed to the ONRW waters of Lake Tahoe, especially pertaining to clarity and typical nutrient levels.

Due to the shallow depths in the Lagoons, and the wide range in daytime and nighttime temperatures, these conditions can drive a diurnal vertical mixing phenomenon: Surface water that has gained heat by sunset gradually cools by mid-night and the cooler, more dense water “sinks”, which creates vertical mixing, particularly in the shallow shoreline areas where day/night temperatures are most extreme.

Figure 2-1: Control Methods Test Final Treatment Sites



2.2 Water Quality Objectives and Constituents of Potential Concern

Water quality standards are identified in the Basin Plan as numerical and narrative water quality objectives for specific water quality constituents. Those water quality objectives with potential to be affected by the CMT activities are identified in Table 2-1. Due to Lake Tahoe's designation as an ONRW, additional water quality requirements apply at the West Lagoon and Marina Lagoon for Tier III compliance with the federal Antidegradation Policy (State Water Board 1990). In addition, TRPA has established water quality thresholds as part of their program to assess and improve the health of the region's aquatic systems.

2.3 Previous Studies and Problematic Conditions

The spread of invasive and nuisance aquatic plants in the Keys and Lake Tahoe has been documented since the mid-1990's. Species identified in the 1990's included Eurasian watermilfoil (*Myriophyllum spicatum*) and coontail (aka "hornwort") (*Ceratophyllum demersum*). An additional invasive plant, curlyleaf pondweed (*Potamogeton crispus*), was detected in 2003 and has spread throughout the Keys lagoons since then. Records of

hydroacoustic scans over the past 10 years show that, typically, by July, more than 90 % of the Keys lagoons and Lake Tallac are infested with the target species at various relative frequency and abundance. The superabundance of the invasive and nuisance aquatic plants creates a nutrient load and nutrient cycling pattern that encourages further growth and spread of these plants and contributes to conditions that can (and have) resulted in cyanobacteria blooms and related toxicity (Harmful Algal Blooms or “HABs”) Past efforts to manage these plants have relied almost exclusively on mechanical harvesting, which stimulates growth and generates viable fragments that can move into Lake Tahoe.

TKPOA has conducted several data collection efforts to document baseline conditions in the Tahoe Keys lagoons for water quality, sediments, and benthic macroinvertebrates. Periodic water quality samples and in situ measurements were taken at 13 locations in the lagoons and nearby Lake Tahoe waters from May to October in 2016 (TKPOA 2017a). TKPOA also collected baseline sediment samples at most of these same locations in the spring and summer of 2016 (TKPOA 2017b). Water samples were analyzed for conventional water quality indicators and nutrients, and sediment samples were analyzed for organic matter content, nutrients, and aluminum. Ranges of nutrient concentrations and water quality measurements in each of the three Tahoe Keys lagoons were provided in Table 3 of the 2016 Baseline Water Quality Report (TKPOA 2017a), and ranges of nutrient and aluminum concentrations in sediment samples from each lagoon were reported in Table 3 of the 2016 Sediment Baseline Report (TKPOA 2017b). Benthic macroinvertebrates were collected at five sites in the lagoons and analyzed for benthic community indices as a biological indicator of water quality and habitat conditions (TKPOA 2017c).

2.4 Project Coordination and Implementation Overview

The CMT is a complex project that has several objectives, multiple regulatory requirements and constraints as well as multiple contractors and teams. The project therefore requires both high level management coupled with coordination with the execution of specific actions. This approach is provided graphically in Attachment B. The QAPP contains sections devoted to “Actions” required, communications needed among participants as well as specific materials, methods and record keeping so that the project can be completed successfully. Due to the several project components within the CMT, the narrative and associated documents (Attachments) should be carefully reviewed.

Table 2-1: Water Quality Objectives and Requirements for the CMT

Water Quality Constituent	Water Quality Objective/Requirement
Temperature	No change
Dissolved Oxygen	Min. 5.0 mg/l; 7-day mean min. 9.5 mg/l; shall not bedepressed more than 10% compared with control site DO; shall not be less than 80% of Saturation
pH	Within range 7.0-8.4 pH units, Max. 0.5 pH units change from ambient
Turbidity	Max. 3 NTU, 1 NTU for shallow waters
Total Nitrogen	Annual Average = 0.15 mg/l
Total Phosphorus	Annual Average = 0.008 mg/l >NOTE: In CMT, the Total P requirement is based on comparison with “control” sites (Not 0.008 mg/l)
Biostimulatory Substances (Ortho-P, Nitrate+Nitrite)	Waters shall not contain biostimulatory substances inconcentrations that promote aquatic growths to the extent that such growths cause nuisance or adverselyaffect the water for beneficial uses
Water Quality Constituent	Water Quality Objective/Requirement (“Receiving Water Compliance”)
Pesticide Active ingredients:	
endothall acid	Note: MCL is 0.1 ppm (100 ppb)
triclopyr acid	Note: MCL is .4 ppm (400 ppb)
Major Pesticide Active Ingredients Degradants:	
3,5,6-Trichloro-2-pyridinol (TCP)	Non-detect in receiving waters at any time, non-detection in application and treatment areas after 3 weeks
3,5,6-Trichloro-2-methoxypyridine (2-MP)	Non-detect in receiving waters at any time, non-detection in application and treatment areas after 3 weeks
Benthic Macroinvertebrates	No reduction in abundance and diversity
Floating Materials (Plant Fragments)	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations thatcause nuisance or adversely affect the water for beneficial uses.

3.0 CMT PROJECT AND WATER QUALITY CONSIDERATIONS

This QAPP has been prepared to ensure collection of scientifically valid water quality and sediment data to compare pre-CMT treatment conditions and post-CMT treatment conditions in order to detect changes and/or recovery of transient changes (weeks to months) resulting from the CMT. In addition to “pre-CMT”/“post-CMT” conditions, treatment effects are also compared with conditions in untreated (“control”) sites. Water

quality sampling will be focused on the periods during which the CMT treatments are undertaken (Years 1,2,3). It is important to note that the water quality conditions in the Keys West Lagoon and Lake Tallac are historically quite different from those in Lake Tahoe water (e.g., phosphorous). For this reason, effects of the CMT treatments are more appropriately compared to conditions in untreated “control” sites in the Keys lagoons that are included as part of the CMT. (See Table 2-1 note regarding phosphorous.)

Water and sediment sampling and water quality measurements will be performed in the CMT sites in the West Lagoon and Lake Tallac, and if necessary (as a conditional action only), in Lake Tahoe proper. To address potential pre-existing toxicity, samples will be analyzed for the active ingredients and major degradation chemicals associated with aquatic herbicides proposed for macrophyte control, to determine if there are any detectable concentrations before any treatments begin (“Baseline” conditions).

To determine if increased nuisance phytoplankton and harmful algal bloom (HAB) productivity occur following CMT treatments, nutrients in the water column will be analyzed with particular focus on phosphorous levels in treatment sites compared to untreated “control sites”. If visual inspections of CMT sites show presence of algal blooms, water samples will be collected to determine the presence and abundance of cyanobacteria, and the presence and level of algal toxins will be determined using standard (ELISA) protocols. If the presence of cyanobacteria *AND* elevated phosphorous levels are detected compared to control sites, then the use of modified Lanthanum (i.e., Phoslock) will be initiated via a “Lanthanum Modified Clay Application Plan” (LMCAP). In other words: both these conditions must be detected in order to initiate LMCAP. (Attachment J)

3.1 Project Goal

The goal of the CMT is the following:

- Reduce the biovolume of target aquatic plants in CMT treatment sites by at least 75% compared to untreated control sites.
- Reduce the plant height (canopy height) so that a 3-foot clearance is obtained between the tops of plants and surface of the water (aka “vessel hull clearance”).
- Increase the presence or abundance of desirable native aquatic plants.
- Reduce the threat of spreading target plants to Lake Tahoe proper.

3.2 Project Objectives

The objectives of the CMT are the following:

- Utilize data obtained to determine if the CMT methods used can provide adequate control of target aquatic plants and reduce the production of viable plants fragments.
- Determine if use of effective methods, including herbicides, can be used while sustaining acceptable water quality standards and without impairing biological functioning as measured by assessment species and types of benthic macroinvertebrates (BMI).
- Protect the water quality of Lake Tahoe

3.3 Information Needs

The information required to meet project objectives includes extensive pre- and post-CMT treatment water quality monitoring through field measurements and laboratory analyses including samples of water collected within and outside the CMT treatment sites. In addition, water samples for herbicide residue (active ingredients and major degradants) will be collected in designated locations in “receiving water” at varying intervals after herbicide applications. (See Attachment H.) These measurements include assessments of efficacy (level of aquatic weed control obtained), and effects of CMT treatments on native aquatic plants in the CMT sites. (See Attachment L.)

3.4 Target Population: Invasive and Nuisance Aquatic Plants

The “target population” for the CMT is comprised of three species of aquatic plants: Eurasian watermilfoil (*Myriophyllum spicatum*), curlyleaf pondweed (*Potamogeton crispus*) and coontail (aka “hornwort”) (*Ceratophyllum demersum*). The CMT sites have been chosen to provide similar compositions of the three target species populations, although it is expected that some variability in species compositions is inevitable, regardless of site selection. Most recent macrophyte surveys show that all target species are located throughout the Keys although there is some “zonation” in distribution: Eurasian watermilfoil is most often associated with shallow areas (<5-6 ft); whereas curlyleaf pondweed and coontail are abundant in deeper areas (>5 ft and up to 15+ ft).

3.5 Non-target Native Aquatic Plants

One of the goals of the CMT is to determine the methods that will not only reduce target plant populations but also encourage the growth and prevalence of desirable native plants. Although non-target native aquatic plants such as *Elodea canadensis*, have been shown to be present in many of the CMT sites, their abundance is very limited. The CMT is aimed at reducing the suppression of desirable native plants caused by the superabundance of invasive and nuisance SAV. At the same time, the CMT is designed to minimize and assess potential negative effects on the desirable species by: (1) utilizing “selective” herbicide products that have little to no effect on those plants (i.e. they are “selective” against the target plants); (2) avoiding where possible, known areas with high frequency and abundance of desirable native plants; (3) utilizing herbicide with short persistence (short “half-life”); and (4) incorporating monitoring methods that will assess effects of all CMT treatments on both the target and desirable non-target plant species within the CMT sites.

3.6 CMT Actions/Treatment/Monitoring Boundaries

The locations and types of monitoring within the CMT are shown in Figures 3-1, 3-2, and 3-3. The sequence of sampling for each type of monitoring event is provided in Section 5 and in Attachment H.

Figure 3-1: Summary of Control Methods Test Monitoring Locations



Figure 3-2: Locations of MiniDot Data Logger/ Buoys at Each CMT Site (DO/ Temperature)

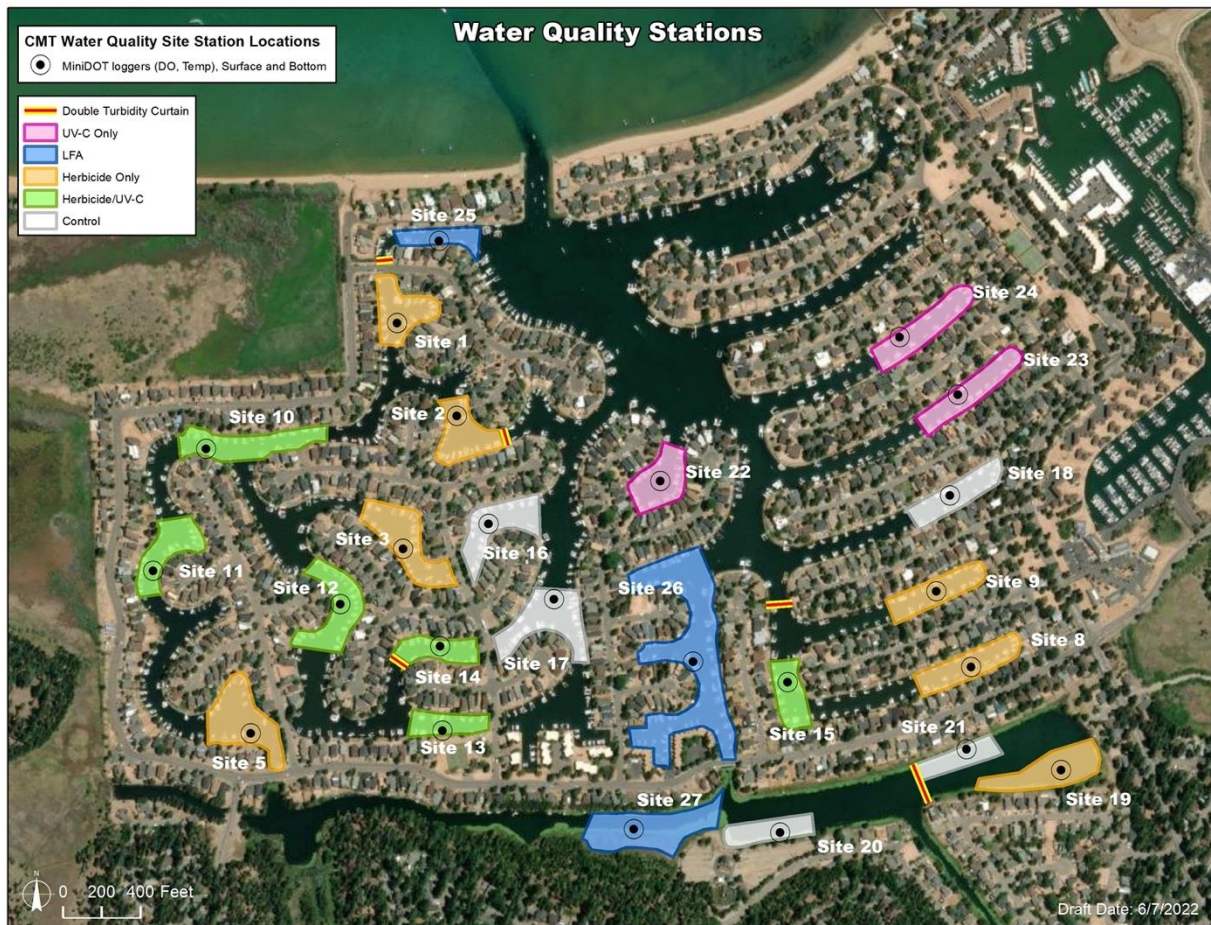


Figure 3-3: Locations for Aerators in Herbicide and Combination Sites in 2022.

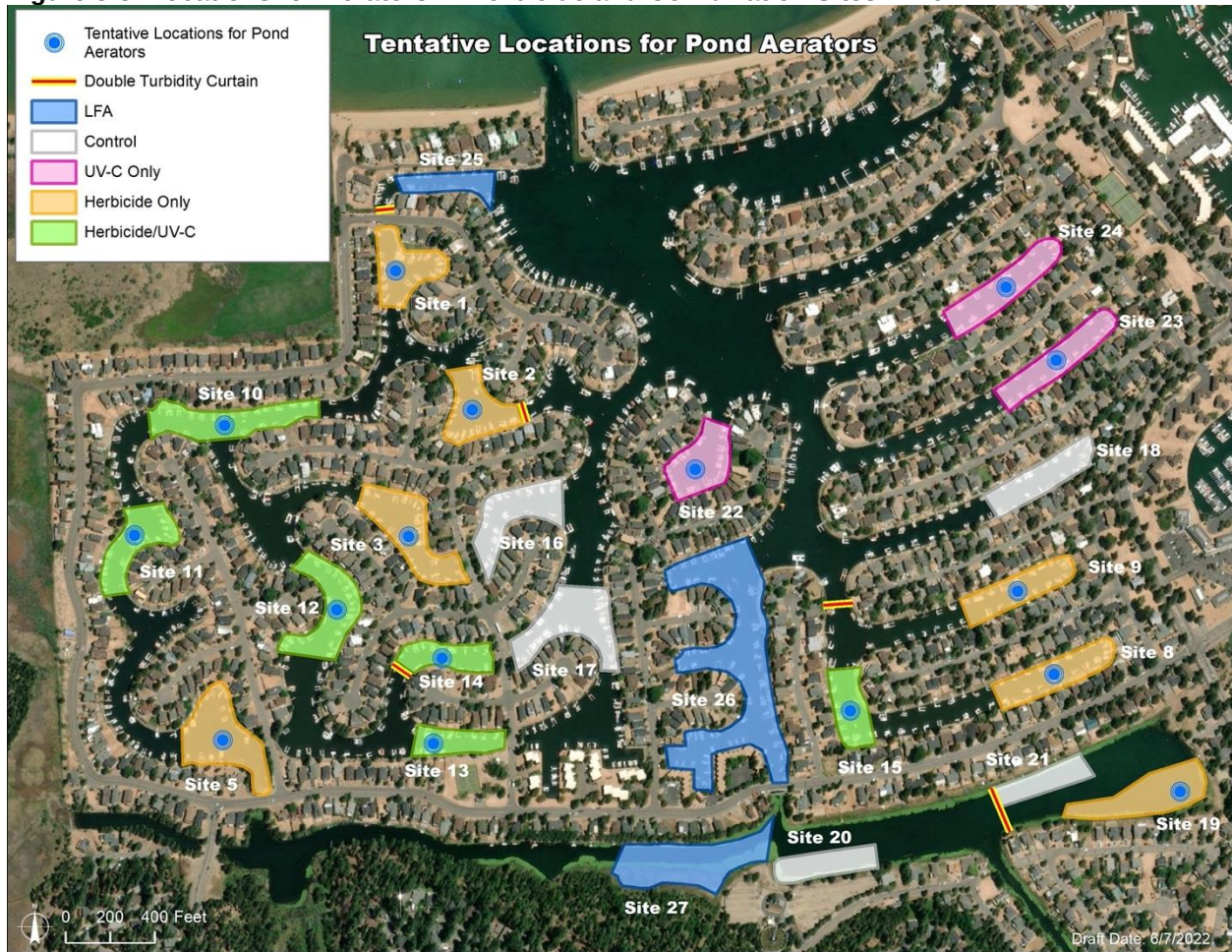
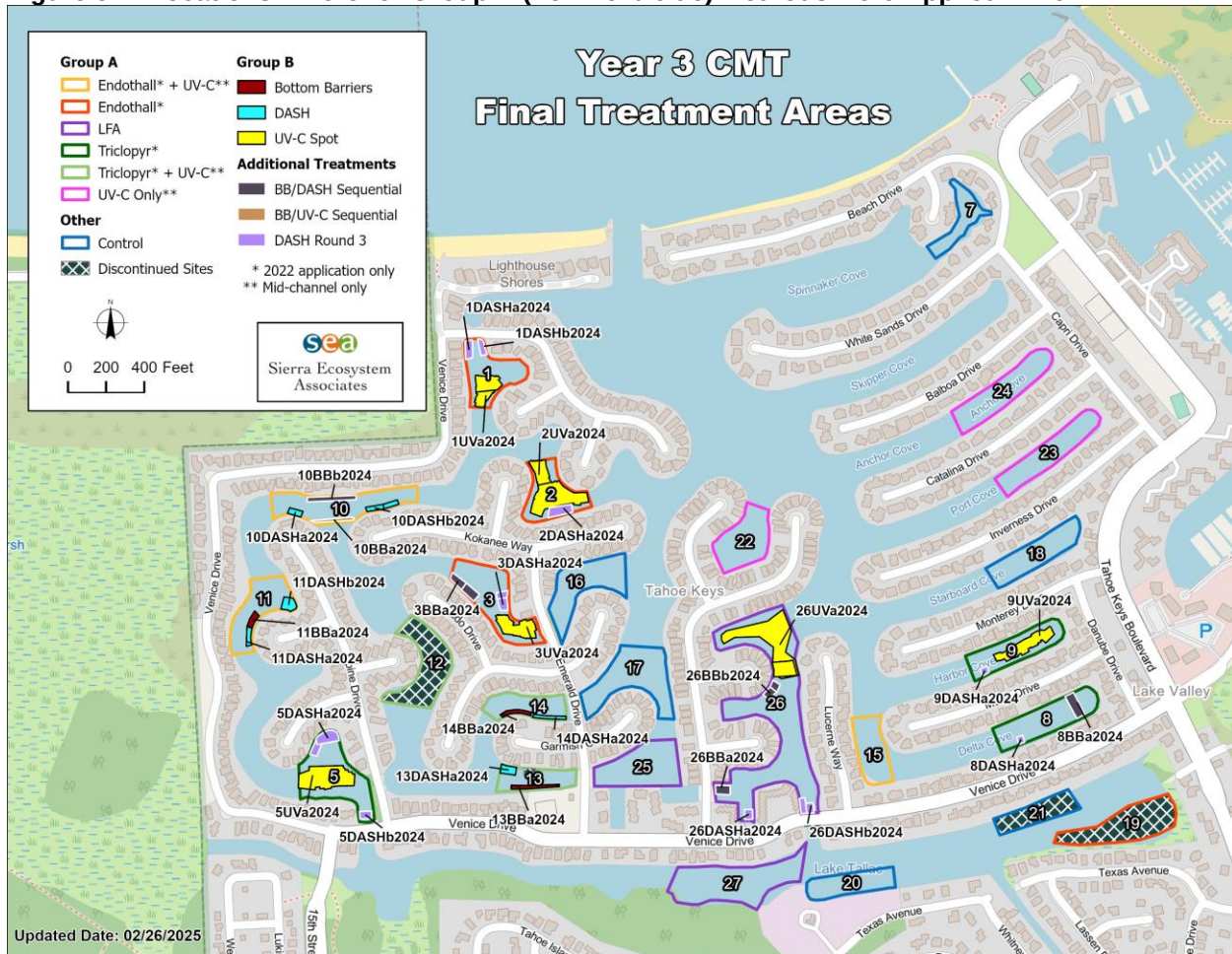


Figure 3-4: Locations Where for Group B (non-herbicide) Methods were Applied in 2024



The CMT sites are confined to the West Lagoon and Lake Tallac (Figure 2-1). No herbicide applications will be made to Lake Tahoe proper. However, the CMT monitoring stations may include Lake Tahoe waters outside of the Tahoe Keys if and only if there is reason to believe (based on RWT dye tracking or detection of herbicide outside physical barriers) that herbicides may migrate or might have migrated to within 500 ft south of the West Channel and potentially may migrate into Lake Tahoe proper. The CMT boundaries are confined, and herbicide movement is further constrained by the installation of double “turbidity” curtains and other constraints on water movement from herbicide exposed sites to other areas of the West Lagoon and beyond. To ensure integrity of the curtains, physical “boat barriers” are installed just outside the curtains. These barriers prevent boats from crossing the double curtains. Thus, the potential for exposure of Lake Tahoe waters to herbicides beyond the intended CMT sites within the West Lagoon is minimized by (1) relatively small sites (1-2 acres); (2) presence of double curtains; and (3) typical filling of the West Lagoon during spring snow-melt runoff into Lake Tahoe. Furthermore, culvert connections between coves are blocked by the physical placement of inflatable “bladder” seals or other types of constraints to prevent water movement. (See Figure 2-1 and Attachment C)

In 2023 and 2024, non-herbicide “Group B” methods were used to sustain AIP control achieved in 2022 (Figure 3-4). All Group B methods required environmental monitoring as follows: UV-C Spot Treatments (nutrient monitoring as in UV-Only methods: Diver Assisted Suction Harvesting (DASH) (turbidity monitoring); and Bottom Barriers (turbidity monitoring and monitoring for proper position and integrity of barriers.)

3.7 Project Task

The CMT encompasses several specific actions and related actions involving teams of contractors and TKPOA staff working in coordination and collaboratively to achieve the CMT goals and to comply with permits. These actions include pre-CMT treatment site preparations and assessments, initiation of CMT treatments, and post-CMT treatment site assessments, specific site sampling and monitoring, initiation and sustained environmental monitoring and reporting. To accomplish the goals and objectives of the CMT presented above, the following actions will be taken.

Action 1a. Coordination, communication and planning with TKPOA staff, TKPOA Contractors, and TRPA Contractors. Due to the number and various types of actions needed to implement the CMT, regular communications and planning sessions will be scheduled to coordinate activities. Daily and weekly meetings (virtual and/or in person) are held to review activities that will be done in the day and week ahead, and the status of CMT actions and issues. TKPOA and TRPA contract managers will arrange coordination meetings either in person or via telecom/video means as appropriate. Contractors arrange their morning daily meetings. The purpose of the meetings is to ensure that CMT treatments, permit compliance and related actions are safely and successfully implemented. It is expected that communications between contractors will include daily and weekly review of work to be accomplished and status of tasks. Contractor, TKPOA and TRPA and Lahontan Contact information is provided so that communications can be efficient and timely (Attachment A).

Action 1b. Coordination and communications with TKPOA homeowners, the public and regulatory agencies. TKPOA has several modes of homeowner communications including monthly newsletter (“Keys Breeze”), direct email and direct mail. The TKPOA Water Quality Committee also has a sub-group focused on outreach and communications pertaining to the CMT activities. TKPOA has regularly (at least weekly) scheduled communications with TRPA and Lahontan Water Board staff. Specifically, letters are sent to homeowners informing them of CMT actions, progress, and how the CMT affects their locations and water access. In addition, homeowners provide valuable volunteer time to assist in the CMT where needed and appropriate. (See Actions 3, 4, below)

Action 2. Use of Proper Equipment, Supplies, and Services

- A. PPE (Personal Protective Equipment) and related equipment. QAL applicator(s) use/apply safety measures as required by product label and labeling and to protect from direct exposure to herbicides, or herbicide containing field water samples, or Rhodamine WT (dye) and will comply with related BMPs (attachments). For

example, as appropriate, Tyvek disposable pants/jackets, (or full Tyvek suits), work gloves, nitrile gloves, safety goggles (eye protection), handwash stations (e.g., 1 gal. of tap water; one per vessel and one at each staging area where herbicides will be handled or loaded). Proper PFD's (personal floatation device) must be worn on vessels underway (see also Section 17, 18 on Boats/Operators). Provide absorbent material mats sufficient to absorb small spills inside the boat.

B. Field sampling equipment, instruments and related equipment. (See details regarding sampling protocols in Section 6)

1. General water quality measurements (non-herbicide grab samples, non-nutrient grab samples). Properly calibrated multiprobe sondes such as YSI, Hydrolab and equivalent backup instruments, and field DO/Temperature loggers such as MiniDOTs.
2. To complement predictive modeling of spring snow-melt runoff and hydraulic gradient between Lake Tahoe and the West Lagoon, flow measuring devices may be used as appropriate such as the OTT MF Pro flow meter. (See Section 5)
3. Fluorometer (for RWT monitoring) equipped with flow-through cuvette or equivalent continuous sampling system. (Recommended: Turner system with flow-through attachment and peristaltic pumping system)
4. For macrophyte (SAV) surveys, double-tined "thatch" rakes on telescoping poles in sufficient number to equip crews (generally one per boat crew). Use of protective covers is recommended for rake tines during transportation (e.g., cloth or foam cover) to protect from sharp edges. (See Attachment L)
5. Electric powered "outboard"/batteries, chargers; 4-cycle or equivalent approved gasoline powered "outboards".
6. Watercraft condition: Documents the safety readiness for boat use. (See also Sections 17, 18).
7. Treatment / sampling site marker buoys, labeled to make sampling stations accessible as needed to ensure consistent sampling and identification.
8. Hydroacoustic scanning equipment: Operational status and properly mounted transducer(s). (See Attachment L)
9. Data storage spaces/lockers/cabinets/locking freezers/refrigerators: working status with recording thermograph.
10. Handheld GPS, or boat-mounted GPS units for treatment actions, monitoring actions and location of "spills" other incidents that may affect safety or CMT related incidents (e.g., Trimble, Garmin, Lowrance, or similar equipment with precision of +/- 10 ft)

C. Services Provided by TKPOA staff, TKPOA and TRPA contractors, and Lahontan Water Board.

This section provides a summary of contractors and others responsible for implementing parts of the CMT. More detail for these actions is found in attachments and BMPs pertaining to the actions. (See Attachment D)

1. Herbicide/Rhodamine WT Applications. (Aquatechnex) QAL- “Certified Applicator” will apply endothall and triclopyr, and Rhodamine WT (dye). Current license/permit for aquatic pesticide application. The Applicator will comply with daily logging requirements (Attachment E).
2. UV-C (ultraviolet type C irradiance) treatments (Inventive Resources, Inc.). One or more vessels having arrays of LED UV-C lamps to be deployed at 3 replicate sites designated as UV-only (i.e., only the UV treatment will be used); or “combination UV/ herbicide” sites (herbicide applied only to the near-shoreline zones between the outer dock edges and shore, and UV treatments applied only to the “open” navigation channel/center zone of the sites (i.e., dock-to-dock). Since UV treatments within a site take several days, treatment dates, locations, and durations will be recorded and provided as weekly update to TRPA and TKPOA primary contacts. See Herbicide Application Schedule (Attachment F)
3. Spill Containment Contingency. (Stratus) Approved Spill Prevention and Response Plan. (Attachment G)
4. Laminar Flow Aeration (“LFA”) (Clean-Flo International, LLC). This treatment consists of air forced from a compressor to submerge diffusers to generate a continuous bubbling and aeration within a zone around the diffuser(s). During installation of diffusers on the bottom, divers will minimize sediment disturbances by minimal contact with sediments and by arranging placement of air delivery tubing to minimize dragging along the bottom. The Contractor will test and verify and document that the system is functioning properly.
5. Standard Water Quality measurement (real-time) (TKPOA staff, ESA/MTS staff): Use properly calibrated multiprobe instruments (YSI, Hydrolab or equivalent). Conduct sampling at required days and intervals to comply with monitoring requirements as stated in APAP (and APAP amendments), MRP and NPDES. Coordinate crews/teams so that access to sampling sites is secure (e.g., boats, drivers, site access methods). Install buoy markers to facilitate access to each sampling station within the CMT sites. (Attachment H)
6. Water Quality Logging Devices/data download. (Stratus): At each CMT site, temperature and dissolved oxygen (DO) will be recorded hourly by “miniDOT” loggers and downloaded weekly from established stations where “miniDOT” logging devices are attached (one near surface and one near bottom of water column). Loggers are factory calibrated. Crews/teams that access and download MiniDOTs will ensure that loggers are surface dried before opening to access download ports and that data transfer is successful. After downloading, crews/teams will ensure that the device’s “O” ring is intact and that device covers are properly screwed tightly to

prevent water from entering the device's electronics. Before redeploying loggers, they should be cleared of debris, algae or other materials that may interfere with sensors (See Attachment H).

7. Nutrient sampling in water. (ESA) Coordinate sampling schedule with the herbicide application schedule (Attachment F, H) in order to:
 - a. Ensure that post-herbicide sampling occurs at proper "days after treatment" for each CMT site to comply with APAP (and APAP amendments) and NPDES.
 - b. Ensure that sampling equipment (e.g., peristaltic pumps, tubing, collection containers) is cleaned between each station by flushing the collection system with clear distilled or deionized water. (Attachment I)
8. Herbicides and degradant sampling. (Blankinship and Associates). Coordinate sampling schedule with the herbicide application schedule to ensure that post-herbicide water sampling occurs at proper "days after treatment" (DAT) for each CMT site to comply with APAP and NPDES, MRP (Attachment H). For sediment sampling, ensure that pre-CMT sampling occurs at least 3 days before CMT herbicide applications. Determine sediment at post-CMT herbicide application date in consultations with TRPA. (Figure 2-1, Attachment H)
9. Benthic Macro-invertebrate sampling ("BMI") (ESA). Pre- and Post- CMT treatment sampling will be conducted using either a petite-Ponar device or other similarly effective device such as a push/corer approved by Lahontan), so that numbers and locations comply with APAP (and APAP amendments) and NPDES, MRP. (Attachment H)
10. Modified Lanthanum Clay applications (Aquatechnex). This is a contingency-only action that is triggered by two conditions: Total P levels above control sites levels *AND* presence of toxin producing cyanobacteria. Application rates are based on total P levels and product recommendation/directions. If those conditions are met, the "Lanthanum Modified Clay Application Plan" (LMCAP) will be implemented. (Attachment J)
11. Well (potable) water monitoring. (Stratus). Ensure the raw (well) water is sampled at correct intervals to comply with NPDES/MRP (24-hour pre-CMT treatments and at 48-hour intervals post treatment for 14 days). (Attachment H)
12. Laboratory analysis. (Blankinship-herbicides water sediment; ESA-nutrients; Stratus- (well water) herbicide, ESA (BMI), via certified laboratory or Lahontan approved laboratories.

Provide documentation of the following: (See Sampling Section 6)

- Ensure proper frequency of sampling is done.
- Ensure proper transport and/or storage conditions preserve samples properly and COC is completed.
- Ensure proper sample labeling is done
- Ensure proper laboratory calibration and spike-standards are done and documented.
- Ensure proper, fully completed COC forms are provided and documented.

13. Installation/Removal of double “turbidity” curtains and culvert “plug”/“bladder” and “Boat Barriers”. (Hiuga Diving Co.; Mountain Pipeline; Pacific Built Inc.) (See Attachment D, BMPs)

- Use methods that minimize sediment disturbance such as “floating” the curtains to installation sites when feasible.
- Ensure the turbidity monitoring crew is ready and in place before installation and during removal of curtains or “plugs” or “bladders” (if bladders are partially in water.)
- Confirm that proper “seal” is made along the bottom of curtains and along the sides of curtains and bladder plugs.
- Ensure the proper lighting is affixed and working as designed (on at dusk/off at dawn).
- Check integrity of turbidity curtain barriers daily and culvert bladder plugs twice daily (TKPOA staff).

Action 3. Staff Training (CMT tasks and Public Communications/Interactions)

All staff with responsibilities for site preparation, pre- and post-monitoring actions, treatment(s), contingency actions, emergency responses and communications will receive documented, hands-on training on the following topics:

- A. Thorough understanding of the CMT project components and their responsibilities within the CMT.
- B. Documented training and awareness of cultural sensitivities and biological conditions and observances. (Provide training record.)
- C. Proper context and use of protective clothing and equipment (PPE)
- D. Boating operation, safety and precautions pertaining to sampling on the water and other required water related actions.
- E. Location, proper use, calibration and maintenance of equipment and instrumentation for which they are responsible for deploying.

- F. Documentation of (recording, notating, and security) calibration records, sampling records, general field note records. Use template(s) created by Contractors and end-of-day report provided by SEA for Daily/ Weekly note and summaries of actions
- G. Notification plans: Phone and email contacts as a “tree” of notifications for both confirmation of normal activities and to communicate any adverse or unexpected circumstances. Staff will be given contact numbers and examples of “need to notify”.
- H. Public communications and interactions including understanding of expected on-site responses to questions, or referrals for questions regarding the CMT project and its components.
- I. Responses to questions or contacts from official “press” or other public media outlets (e.g., radio, television, phone contacts). Staff will be provided examples of referral circumstances. **For most public media contacts, referrals will be made to the TKPOA General Manager (Mr. Halle Kirkingburg).**
- J. Specialized training and orientation for Certified Applicators who will actually apply approved herbicides as part of the CMT treatment regime. NOTE: Only Certified Pesticide Applicators and their supervised staff will handle and apply herbicides; however, it is important for all staff to understand the basic characteristics of the herbicides.
- K. Familiarity with herbicides used, their purpose, mode of action, rate of use (nominal concentration intended), principles/use of UV-C and use of installed Laminar Flow Aeration devices, use of RWT dye, and use of Lanthanum-Modified Clay. Document orientation and training for CMT activities.
- L. Use, characteristics, and application and monitoring (detection) of Rhodamine WT dye, including specific training for those responsible for operating field fluorometry equipment and sampling devices (Blankinship).
- M. Specific training on overall GLP (Good Laboratory Practices) as those practices are pertinent to the CMT project.
- N. All training will be documented with date stamp and disclosures of trainer and trainee.

Action 4. Notifications (Attachment K)

- A. All Tahoe Keys Homeowners. Keep homeowners informed of key decision points, schedules that may affect their use of waterways, streets or other areas. Once sites have been selected, homeowners adjacent to all sites will be notified (14 days before treatments) by email, mail, and door-hangers. An “information/questions”

contact number will be provided for each notified homeowner. This notice may request that owners' boats be moved to sides of docks, or nearshore, when possible, to reduce obstacles for the CMT treatment actions.

Follow up general notification to ALL homeowners stating the timing, placement and approximate duration of double containment curtains via normal communications (E-blast; newsletter; and via monthly billing. Request of homeowners: Preferable, don't launch until barrier curtains are removed) The notices will have a number for more information or questions about the CMT and need for curtains.

1. Notify TKPOA homeowners of Lahontan decision and follow up.
2. Prepare and install signage for CMT sites/curtains and other physical barriers to be installed.
3. Provide calendar of CMT scheduled events on TKPOA website (update weekly)
4. Contact numbers/emails for Q/A and (Hallie Kirkingburg and CMT Project Manager) (See Section 1.1)

B. CMT- Site Homeowners

1. Notify specific homeowners where CMT sites are located: door hangers/calls/emails or other methods that are effective.
2. Notify TKPOA homeowners (and specific homeowners) regarding curtain and aerations device installations: Expected dates for install and removal; duration for install/removal of navigation controls and curtain installation and removal.

C. Agency Notifications: TWSA and other stakeholders will be notified at least 15 days before treatment.

Action 5. Site-Preview and Assessments

- A. Macrophyte surveys. Physical (point sampling) and hydroacoustic scans of aquatic plants will be made at each CMT site, preferably within 15-20 days of proposed herbicide treatments to establish pre-CMT treatment conditions. If weather or other conditions (e.g., poor plant growth due to unusually low water temperatures) delay plant growth, surveys may be implemented at least within 7 days before CMT treatments. Surveys will provide an assessment of rake fullness (ranking of the total amount of all plants on each rake sample), percent composition of plants, relative abundance (proportion of sample a species represents), conditions of plants, and biovolume based on scans. (See Attachment L)
- B. Water volume. For each CMT herbicide site, including the combination sites, the volume of water to which herbicides will be introduced will be calculated based on the physical depth measurements and the hydroacoustic scans (bathymetry and calculating the water volume within those areas). A final Pre-CMT treatment hydroacoustic scan will be done within 14-20 days before treatment. Physical water depths may be taken at evenly spaced points along two linear transects that

occupy the center of sites and water depths at evenly placed locations across the site to capture the gradation in depths to the shoreline. In some cases, the area between the outer edge of the dock/float shore represents a prism shaped volume of water, with a triangular geometry. In some cases, the bulkhead creates a more rectangular shape. The average depths of the sites from these measurements will be compared to depths and water volume determined from the hydroacoustic scans.

Action 6. CMT Sites and Treatment Selection

- A. Plant presence, composition. Using the hydroacoustic data (biovolume and cover), and the species composition from the point sampling, CMT treatments will be assigned to provide as much as possible similar target plant conditions, plant species composition for replicate treatments and across treatment types. Inasmuch as year-to-year conditions change, there is likely to be variability within sites and across sites. Selections are based on recent past year data and current year spring conditions (i.e., year of CMT treatments). However, the use of three “replicate” sites for each herbicide and UV-C treatments minimizes the effects of this variation. In Lake Tallac, only endothall will be used in an approximately 2 - acre site. In Addition, two “control” sites will be used: One within the barrier curtain zone and one outside the curtain in Lake Tallac. (See Figure 2-1)
- B. Final map/schedule (Figure 2-1, Attachment C and Attachment F). This map will be provided to Lahontan as part of NPDES Amendment 2. Commencement of CMT treatment will begin only after Lahontan has acknowledged and accepted the proposed site/treatment selections. The proposed application schedule is provided in Attachment F.
- C. Group B Treatment Selections (2023, 2024). The locations, types of non-herbicide Group B methods and timing of Group B methods is determined by the relative abundance of AIP derived from physical rake sampling in spring of Years 2 and 3. The criteria for Group B use are described in the APAP.

Action 7. Site Preparation

- A. TKPOA Staff will mark CMT sites by installing visual markers that indicate the areas encompassed for each treatment type. These can be shoreline flagging affixed to land-mark structures, or poles (e.g., 2 in. dia. pvc) can be referenced from a boat. Note that in many sites, one end of the site is closed: Therefore, only the “outer” (open end) edges need to be marked and will be GPS referenced as well so that maps of the treated area will be generated. *NOTE: Shape (georeferenced) files can also be used to delineate the CMT sites with associated graphical representations since these can be loaded on to onboard GPS systems to delineate boundaries of the CMT site for herbicide applications.*

- B. Sampling location markers: For each final herbicide (and other) CMT site, green-colored floating buoys (typically about 0.5 to 1 cu. ft. volume) will be anchored within each site. These markers will greatly facilitate repeated sampling for pre/post sampling for both herbicide levels and nutrient sampling. Each anchored location will be GPS referenced for map production and in case a buoy is lost/moved/taken and so that it can be replaced and so that maps can be generated showing actual sample points. Similar sites will be located for “miniDOT” loggers with different colored, GPS referenced buoys (See Figure 3-2). Each floating marker will be labeled with distinct numbers, or appropriate code so that each sample site is associated with a fixed code number. The Site ID code list is provided in Attachment M.

Action 8. Turbidity Curtain and Boat Barrier Installations

- A. Installation: By no later than 2 days before CMT treatments, all double “turbidity” curtains will be installed and checked for integrity: bottom seal and side sealing. All curtains will have at least two warning lights and one warning sign affixed to the floating portion, or on a floating buoy adjacent to the barrier. Signs must be legible from 100 ft away from both sides of the barrier. Signage will state the following, or similar content and emphasis. “Warning! Stay Out! CMT Project in Progress” or similar language. For information call TKPOA: 530-542-6444.” Similarly, physical “Boat Barriers” will be installed after curtains are in place.
- B. Curtain Integrity: Condition of double curtains will be monitored twice daily from “outside” the curtains to ensure sealing is good and anchoring is good. If any breaks or separations from shorelines are detected, the CMT Project Manager will be notified immediately, and curtains will be repaired within 24 hours by divers under contract and on standby for performing repairs.

Action 9. Staging and CMT Treatments

- A. UV-C vessel(s). Vessel launching, use, overnight mooring, cleaning of lights to be coordinated with TKPOA staff and Contractor.
- B. Herbicide application: Staging, equipment and usage: (boats, pumps, safety gear, tanks, cleanup/minor spill containment gear). These are the responsibility of the Certified and Licensed Applicator.
 - 1. At least 30 Days before herbicide applications, the QAL (Certified Applicator), project manager or other authorized, Certified personnel contracted to apply herbicides will physically visit, or virtually review the CMT sites and coordinate with TKPOA staff for locations for launching and storing equipment needed.
 - 2. Contractor will provide secure space and materials for cleanup of small spills/splashes, etc. that may occur during transport to application boats.
 - 3. All liquid herbicides will be contained and only transferred into closed systems to minimize spills. This and other conditions are further explained

in the Spill Prevention and Response Plan prepared for the project. (See Attachment G)

4. Application equipment will be calibrated using fresh water to produce the desired flow rate, or (for granular formulations) disperse rate for bottom distribution in the site to produce the desired nominal concentration.
 5. Only enough herbicide to treat up to three replicate sites in one day with the same herbicide, or up to three sites with different herbicide if this improves monitoring coordination and implementation, will be loaded onto the application vessel(s). Generally, this is a TOTAL of 3-5 acres for three replicate sites or total of three sites if treated with separate herbicide products.
 6. Between treatments with different herbicides, tanks will be rinsed in the last treatment site with 2X volumes of fresh water, before changing to the other herbicide and the rinseate will be discharged into the site in which the same herbicide was applied.
 7. Since one of the herbicides is granular formulation, it will be applied by different equipment (power granular spreader/blower- bow mounted/hand directed). Note that granular spreaders are calibrated using “blank” solid materials.
- C. The Applicator will document all calibration, condition of equipment and use of required PPE for all staff involved with transport, loading and application of herbicides. Records of documentation will be provided CMT Project Manager or designated representative at the close of each day of herbicide application.
- D. The Applicator will provide GPS-referenced tracks and files (e.g., shape files) showing the paths of herbicide applications for each CMT herbicide or Combo site. These tracks will be provided to the CMT Project Manager within 48 hours after end of each day's application.
- E. Staggering and timing of applications: In order to carefully maintain a prescribed post- treatment monitoring schedule, timing of each CMT herbicide application site will be “staggered” by at least 30 min and up to 2 hours from the END of a given application. Larger gaps (e.g. a day or more) between groups of 3 to 4 applications may be used to facilitate subsequent monitoring. In any case an application schedule will be provided to the CMT Project Technical/Monitoring Director within 15 days of the first application The Applicator will notify the CMT Project Manager and Technical/Monitoring Director by phone or in person when each treatment begins and ends and will provide a written record of same within 24 hours after the end of the last application for a given day.
- The Applicator (QAL) will begin the combination site and the herbicide-only site applications on a proposed schedule (Table 3-1). However, the Applicator will notify the CMT Project Manager in writing (email) at least 10 days before applications begin as to which CMT sites are to be treated at what date and time, if differing from the proposed schedule.

The proposed Herbicide Treatment Schedule is provided in Table. 3-1 and Attachment F. *NOTE: If for some reason such as weather or hydraulic conditions, the start of the CMT herbicide treatment is delayed, the daily sequence and “no treatment” days will be followed as in Table 3-1.*

Table 3-1: Schedule of CMT Herbicide Only and Herbicide/UV Combination Treatments

Site Number	Treatment	Proposed Herbicide	Application Date	Application Day
8	Herbicide only	Triclopyr	5/25/22	1
9	Herbicide only	Triclopyr	5/25/22	1
15	Combination	Endothall	5/25/22	1
No Applications			5/26/22	
1	Herbicide only	Endothall	5/27/22	2
2	Herbicide only	Endothall	5/27/22	2
3	Herbicide only	Endothall	5/27/22	2
No Applications			5/28/22	
5	Herbicide only	Triclopyr	5/29/22	3
10	Combination	Endothall	5/29/22	3
11	Combination	Endothall	5/29/22	3
No Applications			5/30/22	
12	Combination	Triclopyr	5/31/22	4
13	Combination	Triclopyr	5/31/22	4
14	Combination	Triclopyr	5/31/22	4
19 (Lake Tallac)	Herbicide only	Endothall	5/31/22	4

F. Coordination of Combination Site treatments.

1. Because the UV-C treatment requires multiple days or weeks, the granular triclopyr or liquid endothall application will precede the UV-C treatments. The UV-C treatments can begin approximately 21 days or more after the herbicide applications, but not until the barrier curtains are removed, or if there is access to sites even when curtains are in place. The UV-C treatments in the Combination sites can therefore begin in the first herbicide sites after removal of barrier curtains within which the site is contained. In any case the UV C vessels should be deployed to best accomplish the UV-C only treatments first (i.e., unrestricted by curtains).

2. Rinsing UV-C light array upon leaving a CMT site. Note: When the UV vessel enters an area after curtains are removed, the washing of submersed light arrays is not necessary except to maintain lamp clarity and UV-C irradiance power.
- G. Preparations for contingency Lanthanum applications (based on exceedance of control site Total P levels and presence of cyanobacteria toxins). (Implementation of LMCAP). The Applicator will have product (Phoslock) staged and ready to apply within 48 hours of P-level exceedance and confirmation of cyanobacteria toxin) Lanthanum monitoring protocols will be initiated within 48 hours after application. (Attachment J)

Action 10. Standard Harvesting/Skimmming: only outside of CMT sites, except that CMT Control site will be harvested as part of regular harvesting schedule

- A. Harvesting/skimmming boat equipment readied (repairs/maintenance) and launched.
- B. Crews trained
- C. Coordinate harvesting activities with crews continuing to conduct CMT monitoring.
- D. Communications/reporting/recording estimated harvested biomass

Action 11. Monitoring Documentations, Records and DATA. Grab (nutrient), Point Intercept, YSI, Hydrolab, datalogger monitoring

- A. Records/General
 1. Sampling station ID/locations/buoy marking: Stations will be located on a map and utilize the ID provided by TKPOA as part of each sample. (Attachment M) (See also Fig.)
 2. Establishment of Monitoring Calendar and Schedule (See attachment H). Each Contractor will establish a monitoring schedule that complies with the requirements in the NPDES, APAP (and Amendments,1,2).
 3. Documentations of TKPOA staff training (April 1, 2022)
 4. Records and other credentials of any out-sourced monitoring service or activity under contract for compliance with the NPDES monitoring. This also includes any laboratory analyses conducted by a commercial, certified analytical laboratory.
 5. Schedule and locations for downloading recording loggers and associated sample stations.

6. Record of instrument calibrations and maintenance schedule for all monitoring equipment. (e.g., YSI, Hydrolab standard water quality variables measurements; fluorometer used for detection of RWT dye). These records will be securely stored in locked file cabinets and clearly labeled by Site Code(s) (See Attachment M).
 7. Monitoring logs showing actual dates, times, locations, and staff conducting monitoring. These logs must be maintained digitally and/or in pre-paginate notebooks and entries must be dated and signed by whomever physically conducts the monitoring (e.g., whoever downloads loggers, whoever records YSI or Hydrolab data, or fluorometer data following herbicide applications). Hardcopy records and logs may also be scanned to provide efficient digital storage and transfer and reporting.
 8. Master Monitoring Log: CMT Project Manager maintains a master log with calendars, schedules, and notations of compliance logging events as a summary check list to ensure that all required monitoring has been done as prescribed. This log also properly notes if/when there are problems with any monitoring and how the problem is resolved (e.g., repeated). This log must have all entries dated and signed by the responsible monitoring staff person. This log may also be maintained in a digital format (e.g., Excel), but must include the hardcopy, dated, signed entries as well.
- B. Hydroacoustic Scans (Biovolume, plant canopy height, generation of “heat maps”) (See Attachment L)
1. Primary Equipment tested; backup systems tested
 2. Crews trained
 3. Data Storage system secure (backup/ “cloud”/ BioBase back up)
 4. Scan Schedule/map generated
 5. Post-scan crew documentation (log of dates, times, locations, operators, issues)
 6. Generation of “heat” maps (color-coded biovolume or percent cover) with CMT sites identified.
 7. Generation of graphics that depict “Vessel Hull Clearance” between the water surface and top of the AIP canopy.
- C. Physical samples (Point Intercept) (See Attachment L.)
1. Functioning telescoping pole/ rakes w/ safety line and depth markers on poles

2. Training of sampling crew: Proper sampling methods (See Attachment L: Protocols)
3. Training for assessing plant "condition" (health) (1-5 scale; 5= normal/healthy) (Attachment L)
4. Training crews on estimating the "rake fullness" metric.
5. Training plant identification (with available laminated ID cards)- one set per crew.
6. Still Digital Photo- record of rake sample with ID reference for site and station number. Note: A light to medium blue background is recommended for photographing plants on rakes, or plants removed from rakes.
7. Record logs: date, time, GPS, plants found, condition, images taken, crew ID.
8. Unidentifiable plants: A specimen must be retained (e.g., Ziploc bag in cooler) for later identification. Notation on sample bag must include: Date, Site, Sample Station and collector name.
9. Adjustments to number of samples taken to provide reasonable coverage of area where Group B methods were used (See Attachment L.)
10. Fresh weight plants on f rake samples may be recorded for selected dates and CMT Sites in order to determine the correlation between "Rak Fullness" and fresh weights from the same rake sample (See Attachment L).
11. Turion counts: For each rake sample, the number of Curlyleaf Pondweed turions will be recorded and the length of any sprouted turions will be recorded.

D. Physical Samples: DASH Methods

1. The fresh weight of diver-removed plants will be recorded
2. Turion counts: From known volumes of sub-samples of plants removed during DASH activity per site, the number of turions present will be recorded.

E. Video Recordings. NOTE: This is an optional activity. Underwater photography/videos are contingent on adequate visibility to assess plant species and condition. If visibility is insufficient to capture at least two feet of image depth (horizontal and vertical) this method will be discontinued during those conditions.

1. Equipment: Pole mounted cameras (such as GoPro or similar): three-depth lateral orientation and vertical orientation (bottom, mid-depth, and near surface) as feasible.
2. Fixed-orientation video recording.
3. GPS reference logging (should be same as physical point GPS reference.) pole placement/ rotation.
4. Download, storage, security of video clips in media.

5. Analysis of video clips by sample site/CMT site/Date: This is a contingent activity based on water clarity, image clarity. This may include selected time-sequences to illustrate Pre- and Post CMT treatment effects.

Action 12. Sample Collection, Storage, Transport (Chain of Custody “COC”)

A. Herbicides and Degradants and Rhodamine WT

1. Inside each herbicide-treated site. Sampling frequency: Pre, 7, 14, 21 DAT. (plus xDAT if necessary) (See Figure 3-1 and Attachment H-1)
2. Outside double curtains West lagoon: CMT stations immediately outside curtains.
 - a. RWT measurements are to be made daily beginning 24 after herbicides are applied to the areas excluded by specific curtains (see Figure 2-1, areas A, B, C) This daily monitoring will continue until the end of the last herbicide application (approximately May 31, 2022). RWT monitoring outside the curtains will continue after the last herbicide application every 48 hours until curtains are removed.
 - b. Herbicide grab samples will be taken 3,7,14,21 DAT

NOTE: If RWT or herbicides are detected, this will trigger further grab samples at “Contingency Sites” in the West Lagoon (See Fig. 3-1 and Attachment H)

3. Outside double curtain in Lake Tallac and one station to the east of 15th St: Grab samples will be taken at 3,7,14,21 DAT (This sampling DOES NOT trigger contingent sampling). (See Figure 2-1)
4. RWT/Contingent samples: At three locations in receiving water outside double curtains, RWT will be measured at 48-hour intervals. If RWT is detected, this triggers grab samples for herbicide analysis. (See Figure 2-1 and Attachment H)
5. For each of the above (A-E) locations/types of herbicide grab sampling:
 - a. All sample bottles will be pre-labelled using waterproof medium and listed in sample log by Site Code and date. At least four un-labelled extra bottles and blank labels for each sampling site event will be included in the sample kit in case they are needed. Samples may be labeled at the time of sampling if pre-labeled bottles are in error or additional samples are required by a “split” for any purpose. The contractor may utilize their own sample coding but must have cross reference to TKPOA CMT code IDs (Attachment M)

- b. Any preservation chemicals needed will be added to each pre-labelled sample bottle before taken to the field sample site. (Generally sufficed by placing sample bottles in iced cooler until transferred to storage of shipping to laboratory for analysis.)
- c. At each CMT Site to which a herbicide has been applied, three sample stations depths are composited to provide a representative sample of the water within the station. Composite samples are made by taking equal volumes of water from surface, mid-depth and bottom zone at three sites within each CMT/ Herbicide site (See Sampling Equipment).
- d. Once a composite sample is contained, and closure is tight, it is immediately place in a Ziplock bag or similar closed, suitably secure container, labelled with the Site Code (if not pre-labeled), and placed in a light-tight cooler containing “blue-ice” pack. Subsequent samples from the same site are placed in the same Ziploc bag or container.
- e. Once a sample has been placed in the cooler, this is noted in the field sample log (Site, Time, Date, initials of sampling person). See Sample frequency (Attachment H)
- f. At all sampling events, 5% of samples are “duplicate” collections: For the duplicate collections, there will be two bottles with replicate samples for that sample event. The two bottles will be labelled with the same Site code, date, time but with either “A”, or “B” added to the label to separate the duplicate samples. Note only the duplicate samples representing 5% of the total sampling event are analyzed along with the regular samples.
- g. Cleaning sampling system between stations and between sites: within a Site, sampling tubing shall be flushed with 2x to 3x sample tube volume using DI. The rinseate may be drained back to the sample station location because the volume is exceedingly small compared to the. Rinseate may also be collected after final flush for confirmation of decontamination (e.g., randomly chose one sample station in 20 to collect rinseate.) Rinseate sample will be so labeled and included in batch shipped to the laboratory for analysis. Between CMT sites, use a new section of tubing and retain the old tubing for proper disposal (See Attachment I)
- h. Transport, Storage, and Chain of Custody (COC). COC’s must be completely filled out and signed for any transfer of samples.

- i. Upon completion of sampling event for the day, all samples (contained in Ziploc bag or similar closed bag for each Site) will be deposited in locked refrigerator or freezer (depending on preservation needed). When the samples are deposited for storage a Chain of Custody (COC) form will be completed by whomever deposits the sample. The COC forms may be provided by ESA, Blankinship, Stratus and laboratories for within-laboratory documentation. The COC will contain a list of the samples by Site code and sample code, Date, Time of sampling and name of person sampling and name of person storing the samples. The COC form will then be photocopied. One copy will be archived in secured file; the other (original) will be placed in a protective Ziploc to be included with any movement of store samples (e.g., for shipping, hand-delivery to analytical laboratory).

Samples will be shipped or hand-carried (currier) to analytical laboratory(s) either on the same day they were taken or by noon on the following day.

NOTE: For any “recipients” of samples, any discrepancies in the contents and the accompanying COC will be immediately communicated to the “Provider” and CMT Project Manager for resolution.

B. Nutrients grab samples: (also, see Note “8” below)

1. Sampling frequency for specific types of CMT sites (See Attachment H)
 - a. **Herbicide sites:** Pre-, 7 DAT, then weekly thereafter: 14, 21, 28 DAT.
 - b. **UV sites:** Start 14 DAT and weekly thereafter until 14 Days after the last UV treatment is made. Note: Post UV-C treatment grab samples timing and intervals may be modified for UV-Spot treatments and for Year 3 “Sequential-Post Bottom Barrier Removal” UV-C treatments as noted in Attachment H. The protocols for sampling and analysis of nutrients in the “Sequential” sites are the same for other nutrient sampling and analysis.(Attachment H)
2. Samples are comprised of composited, equal volumes from bottom, mid-depth and surface water at each of three sampling stations and a combined composite of three stations as the Site Sample for that monitoring event.
3. All sample bottles will be pre-labelled using waterproof medium and listed in sample log by Site Code and date. At least four un-labelled extra bottles

for each sampling site event will be included in the sample kit in case they are needed.

4. Sampling (pumping) device shall be rinsed with distilled water between stations with sufficient DI to flush 2-3 X volumes of the sampling tubing. Rinseate may be returned to the station just sampled. Between Sites, new tubing shall be used. Tubing shall be replaced between sampling dates so that new tubing will be used at the start of any day of sampling, as well as between Sites. The only exception is that sampling tubes used ONLY in control sites may be re-used between sampling days after 3x volume cleaning with a suitable, non-P containing detergent such as "Liquinox" followed by 3x rinses with DI.
5. At all sampling events, 5% of samples are "duplicate" collections: For the duplicate collections, there will be two bottles with replicate samples for that sample event. (Note: only duplicate samples representing 5% of total for sampling even are analyzed along with the rest of the samples.) The two bottles will be labelled with the same Site code, date, time but with either "A", or "B" added to the label to separate the duplicate samples.
6. See Nutrient sampling schedule attached for frequency (Attachment H).
7. Transport, Storage, and Chain of Custody (COC).

Upon completion of sampling event for the day, all samples (contained in Ziploc bags for each Site) will be deposited in locked refrigerator or freezer (depending on preservation needed). When the samples are deposited for storage a Chain of Custody (COC) form will be completed by whomever deposits the sample. The COC will contain a list of the samples by Site code and sample code, Date, Time of sampling and name of person sampling and name of person storing the samples. The COC form will then be photocopied. One copy will be archived in secured file; the other (original) will be placed in a protective Ziploc to be included with any movement of store samples (e.g., for shipping, hand-delivery to analytical laboratory).

8. *Important NOTE: For nutrient analysis, water samples will be shipped or hand-carried (currier) to analytical laboratory(s) either on the same day they were taken or so that they reach the analytical laboratory for analysis within 48 hours after collection. However, if scheduled sampling day prohibits timely shipping for receipt at analytical laboratory to maintain 48-hour maximum sample retention for sample integrity, the sampling day can be altered within a 48-hour period to ensure proper receipt and analysis of samples. This variation will have little effect on results because the sampling frequency is weekly.*

- C. BMI sampling. (ESA). The protocol used for prior BMI sampling, preservation and analysis (2019, 2021) will be used for all required BMI sampling to comply with the NPDES. (See Attachments H and I)

Action 13. Records Security, Storage and Transport.

The intent of these activities is to ensure that all CMT treatment notes, logs and monitoring data are recorded appropriately and in a timely manner and that the data (digital and hard copy) are securely stored, and that back-up copies are also securely stored in a separate safe location. All data records must be backed- up weekly: (a) photocopied if hard copy printouts; or (b) copied digitally in secure media (e.g., separate, dedicated hard drive that is accessible only to the CMT Project Manager or their designated staff representative). The backup records must be stored at a location separate from locations used on a daily, routine basis (e.g., for scheduling monitoring activities). (Attachment N for map of suggested on-site and backup storage locations.)

Action 14. Reporting to Regulatory Agencies During CMT actions

The NPDES requires certain other notification to Lahontan, TRPA as part of the CMT. The CMT Project Manager will maintain a calendar of required reporting times, reporting modes (telecom, email, and written/mailed reports or notices). Reports will include such items and events as: (1) Spills; (2) Over or incorrect application; (3) Detections of RWT in receiving water or outside curtain barriers; (4) Loss of integrity of curtain barriers; (5) Results of water quality analysis that trigger responses such as the LMCAP or contingent herbicide sampling outside the curtain barriers, or other conditions that may affect monitoring activities.

Action 15. Reports to Regulatory Agencies:

The following reports will be provided to Lahontan Water Board and TRPA:

- A. Daily or weekly Reports: Herbicide Residue analysis as results are obtained from contract laboratories. Any exceedances are reported within 24 hours.
- B. Daily or Weekly reports: Nutrient analysis as results are obtained from contract laboratories. Exceedances in total P compared to control site will be reported within 24 hour and implementation of the LMCAP will be initiated (Attachment J)
- C. Weekly Reports: Standard Water Quality (real-time/ multiprobe instruments)
- D. Weekly Reports: miniDOT logger downloaded data.
- E. Annual Report on CMT: To Lahontan Water Board by March 1 follow the year of CMT start and subsequent years during which CMT is implemented.

Action 16. QA/QC Compliance.

These compliances consist of two types of activities:

- A. TKPOA Staff (CMT Project Manager and staff) oversight: This includes daily or weekly briefings and de-briefings on CMT activities (treatments, monitoring, communications, and contingency response preparedness). The CMT Project Manager shall maintain a record of these meetings, on-going training and observational notes that explain how actions are being carried out so the QA/QC and BMPs are assured. (see Attachment D)
- B. Contracted activities: QA/QC reviews and oversight (TRPA Contractors): TKPOA or TRPA may engage on their own, or through a credible resource (company or service) to perform on-sight observations of CMT activities including treatments, monitoring, sample handling, sample storage, sample shipping, and data and other CMT- related record keeping. Any QA/QC outsourced service shall provide the CMT Project Manager with a written summary of observations, noted problems and shall recommend remedies if problems are noted. The reports are typically weekly, but also can and should occur any time a significant problem is observed- without delay. In order for any outsourced service to be effective, their staff need access to CMT actions, and “ride-a-long” opportunities to witness CMT actions.

Action 17. Vessel Maintenance and Repair and Use

TKPOA boats used for CMT need to be fully operational, numbered or otherwise clearly identified and inventoried on a Vessel Use Log (VUL). The purpose of the VUL is to identify and coordinate locations, dedicated use(s), condition (operational status), operators and R&M schedules.

Vessels used for water sampling (e.g., nutrients and standard water quality such as YSI or Hydrolab use) can be powered by standard 4-cycle (or approved systems), electrical outboards (e.g., Torqeedo). The rationale for electric outboards is to minimize potential “water transfer” (via engine cooling systems) between CMT sites, and to maximize ease in controlling vessel positions, and to eliminate staff exposure to exhaust during site monitoring activities. However, sampling behind (inside) curtained zones will be done using boats that DO NOT launch into area outside the curtains in order to eliminate boat/water contamination outside the curtains. During Pre-treatment sampling, and when curtains are removed, all vessels are allowable in all CMT sites for remainder of monitoring activities.

The following tasks ensure boat utility, safety and operational readiness

- A. Safety and Contingency Resources. All vessels must be inspected daily before and after use for integrity of hull, drive systems (motors/steering), and containment of the following:

1. dock lines in good condition
2. Sound (acoustic) warning device in working condition (air horn and whistle)
3. Flashlight in working condition
4. Bailing pail or hand operated pump
5. Sufficient battery/ fuel to complete daily tasks
6. Clean decks and cockpits- free of debris that could create tripping or slipping hazard
7. Absorbent mats for spills
8. Anchor and sufficient rode (ca. 50 ft) appropriate for the vessel size.
9. PFD's sufficient for operator and any passenger staff

(NOTE: See 3 below regard operator and passenger responsibilities)

Action 18. Vessel Operator (VO), Crew Safety

The vessel operator ("driver") is responsible for inspection of vessel condition and having required safety and contingency equipment and supplies on board before leaving a dock area. All VO's will have been trained on the equipment for the type of vessel used. All VO's will have in their possession a current California Boater Card.

A. VO Responsibilities:

1. VO will review safety measures with all passengers/crew before leaving dock.
2. VO will review with the crew the daily task(s) and estimated time on the water.
3. VO will ensure that ALL on board are correctly wearing a suitable PFD before leaving the dock.
4. VO will ensure that a working cell phone is accessible on board with pre-programmed number for the CMT Project Manager. (This may be in possession of the VO and/or any Crew).
5. VO will determine if conditions (weather, crew, equipment, vessel) are suitable and safe for completing the daily task(s) and can abort the daily work if conditions change from suitable and safe to unsafe or that present unreasonable or likely risks to anyone on board.
6. Upon return to dock, VO will complete a Vessel Exit Log (VEL) that documents any problems, needed R&M and recommendations for improvements in vessel operations and readiness. The VEL will be provided to the CMT Project Manager: by hard-copy or digitally and forwarded to the CMT Project Manager as an email attachment on the same day as the vessel was in operation by the VO.

- B. Crew and Passenger(s). Anyone on board will either be part of the work-day crew, or potentially a passenger responsible for QA/QC oversight. Both crew and passenger(s) must abide by the VO's directions and assist in VO's inspection of safety equipment, proper PFD use and safety reviews before leaving the dock. On-water time is costly and usually time-sensitive, and therefore it is essential that proper preparations for daily vessel/crew operations are thorough so that time on the water is efficient, safe and productive.
1. Passengers/Crew will properly wear appropriate PFD's before leaving the dock.
 2. Passengers/ Crew will ask the VO for any clarifications needed for the daily task before leaving the dock.
 3. Passengers/Crew will inform the VO that all supplies, materials, and equipment are on-board and in working order before leaving the dock. The daily task will not begin, and vessel will remain at dock until all necessary supplies, materials, and equipment in working order are on board. Passenger(s)/Crew will provide the VO with a checklist that documents that all necessary supplies, materials and equipment needed for the daily task(s) are on board.
 4. Passenger(s)/Crew will immediately inform the VO if they become aware of any potential unsafe or hazardous conditions, before leaving the dock or at any time during the daily task(s) operations.
 5. Passenger(s)/Crew will inform the VO if anyone onboard is ill, in stress or otherwise unable to carry out their responsibilities.
 6. Upon completion of the daily task(s), and arrival at dock, Passenger(s)/Crew will assist the VO in unloading equipment, cleaning and clearing decks and cockpit areas free of debris and hazards.

Action 19. Removal of Curtains

1. Requirements (criteria) for curtain removal (Compliance for NPDES and MMRP):
 - a. Turbidity monitoring must start at least 1 hour after the removal of the curtains and continue to occur hourly during the removal of the barriers. Samples must be taken daily until compliance with the Water Quality Objectives is demonstrated after the removal of the barriers.
 - b. Visual monitoring must occur no further than 2 feet away from removal activities. If elevated levels of turbidity are present during visual monitoring then activities must cease, only to resume once levels of turbidity decrease.

- c. Discrete samples of turbidity must be taken at surface, mid-depth, and bottom and reported in the annual report. Samples can be taken by a calibrated handheld turbidity meter. Calibration reports must be included in annual report.
 - d. Turbidity curtains must be maintained until **all** herbicide treatment sites have a minimum of two consecutive samples, taken at least 48 hours apart, at non-detect levels (i.e. below the reporting limit for the receiving water limitation parameters in table 4) [Permit section VI.C.d.ii]
 - e. The Discharger must demonstrate compliance with receiving water limitations in treatment areas within 21 days after the application event
 - f. Lahontan staff request to see the data demonstrating the treatment areas are below reporting limits for aquatic herbicide prior to the removal of the turbidity curtains
- 2. Notification
Notify Property Owners (48-hour notice)
 - 3. Transport/ cleaning/ storage/inventory
Check curtain condition and provide proper storage to maintain serviceable condition.

Action 20. Installation and Removal of Bottom Barriers (Group B method)

- 1. Requirements (criteria) for Bottom Barrier installation and removal (Compliance for NPDES and MMRP):
 - a. During installation and removal, turbidity must be recorded within the Site hourly.
 - b. If turbidity exceeds pre-diver action by 10%, operation will be stopped until turbidity is reduced to acceptable levels.

Action 21 Contingency Spill Response. Spill Prevention and Response Plan (Attachment D)

Action 22. Contingency HAB/P/LMCAP (Attachment J)

NOTE: Criteria for LMCAP initiation: Total P is elevated 25% higher than Control sites AND cyanobacteria that form toxins are detected in water samples.

Action 23. Deployment and Activation of aerators in CMT herbicide/UV-C sites

- A. Map showing locations for aerator deployment (Attachment O)
- B. Contingent Deployment: Aerators are installed, or available for use within 24 hours of DO decline at each CMT site (Except Controls and LFA). Activation is started

as required (e.g., within 14 DAT), if DO is reduced by below 5 mg/l average over 24 h. Once aeration has begun it is continued up to 30 DAT in Herbicide-treated sites if deployed. For UV Only sites, if activated, aeration will continue 30 Days after the last UV-C treatment unless conditions prohibit (e.g., ice cover).

Action 24. Fragment Containment

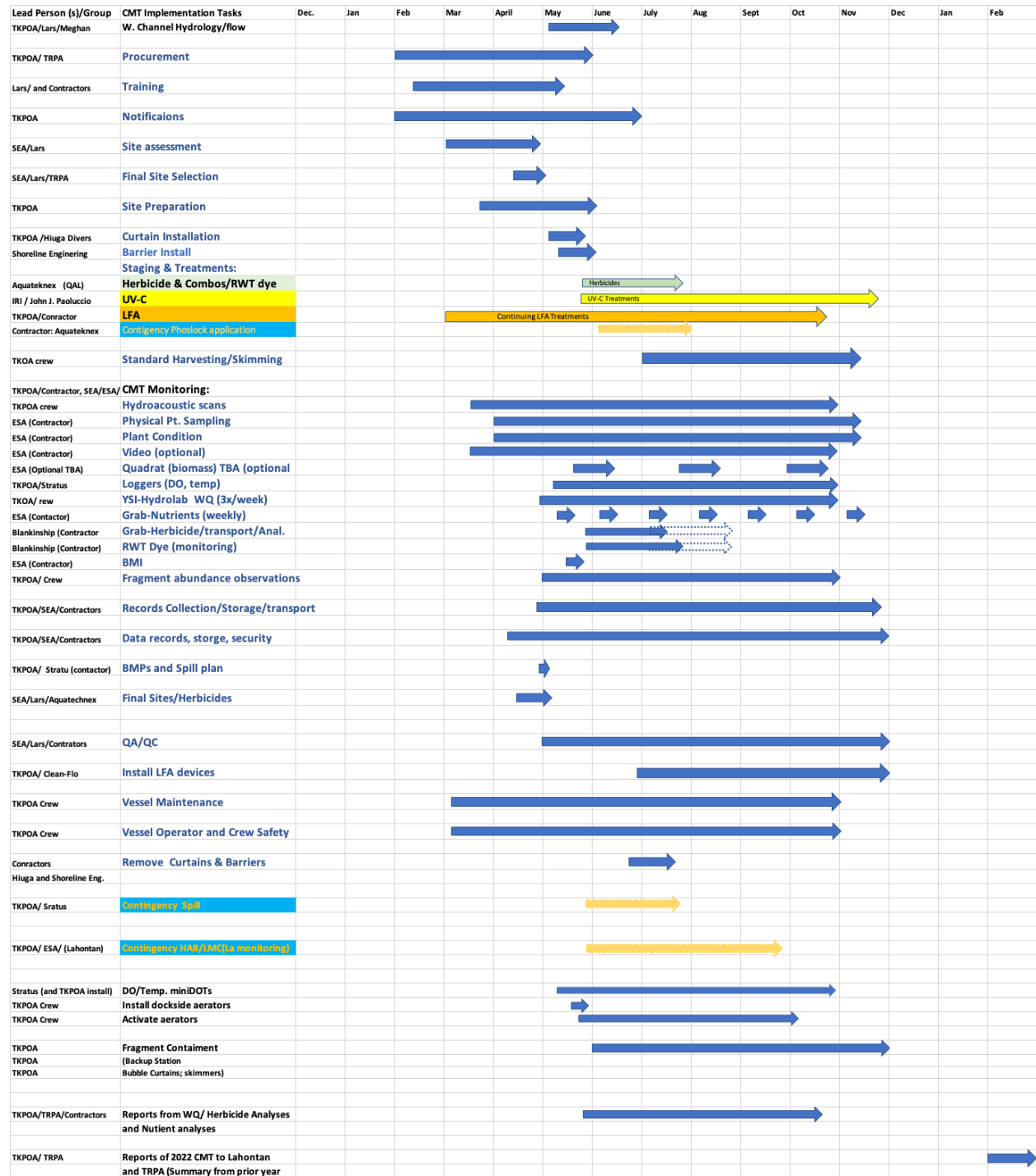
Implement standard skimmer boat and backup station deployment as they are routinely done. (TKPOA Harvesting schedule; TKPOA reports on Backup Station use)

3.8 Work Schedule

The anticipated work/task schedule is provided in Figure 3-5 (see also Attachment H). Some of the tasks are dependent on date that CMT treatment begins; others (typically pre-field work such as procurement and training) will occur at appropriate times to ensure completion before CMT treatments begin.

Note: Times for specific tasks may vary due to weather, equipment or staff or other conditions that warrant altering the schedule. However, required CMT monitoring “Posttreatment” schedule sequences will be conducted at prescribed intervals based on start dates for herbicide only and herbicide combination treatments and based on completion dates for UV-C and FLA treatments. Similarly, the work schedule for 2023 and 2024 Group B methods will be adapted to existing AIP conditions and the locations where Group B methods are used (See Year 2 and Year 3 CMT Annual Reports for Group B locations and Schedules)

Figure 3-5: CMT Project Work Schedule



4.0 QUALITY OBJECTIVES

The primary objectives of the CMT are:

1. To quantifiably assess the following using consistent methodologies, protocols:
 - a. Target and native aquatic plant biovolume, canopy height and conditions.
 - b. Water quality variables that may be affected by the CMT.
 - c. Levels (concentration) and location(s) of aquatic herbicide active ingredients and major degradants.
 - d. Biological status of benthic macroinvertebrates (pre- and post- CMT)
 - e. Determine is Pre-CMT conditions of water quality and biological integrity are restored follow CMT.
2. To develop data, reach conclusions and evaluations other related information that will inform the improvement of target aquatic plant management in the Keys Lagoons.

4.1 Data Quality Objectives

Data quality objectives (DQOs) are used to provide reliable assessment of the effectiveness and other impacts in the CMT sites to the CMT treatments. Sufficient and proper types of sampling, timing or measurements and data recording are essential for obtaining reliable data. Since aquatic plants grow and change from early spring through fall, the frequency of plant and water quality sampling is a critical component of DQO's.

The following actions and equipment help ensure data quality:

1. Multiple methods for assessing responses of target plants to CMT treatments (Attachment L)
2. Use of calibrated, continuous data logging devices (miniDOT temperature and DO)
3. Use of redundant sampling (e.g., auto logging devices and hand-held devices)
4. Diligent calibration of instruments used to measure CMT effects
5. GLP and standard acceptable laboratory practices.
6. Using consistently representative sampling site, methods and cautions against cross-contamination of samples.
7. Use of duplicate samples (e.g., for water quality and herbicide residue assessments)

4.2 Measurement Quality Objectives

Water samples will be preserved, handled, and stored in a consistent manner using accepted procedures for maintaining sample integrity prior to analysis. Proper and consistent measurement unit will provide uniform formats for comparisons of sequential measurements and for comparisons of data from CMT sites. Field measurements collected during the baseline water quality monitoring will be expressed in degrees F and °C for water temperature, concentrations of milligrams per liter (mg/L), or if applicable, in parts per million (ppm) or in parts per billion (ppb), and percent saturation for DO, standard units for pH, and nephelometric turbidity units (NTU) for turbidity. Laboratory analytical data will be expressed in concentrations of mg/L for nutrients and micrograms per liter (µg/L) for herbicides and their degradants.

Sampling and assessments for target and non-target plant responses include physical (rake) sampling, hydroacoustic scans (biovolume and plant height), and plant conditions rating (5=normal, healthy, robust; 1 = dead/decomposing) (See Attachment L)

Table 4-1: Measurement Water Quality Objectives

Field Measurements in Freshwater								
Water Quality Parameter	Measurement Device	Units	Resolution	Instrument Accuracy Specs	Points per calibration	Pre-Sampling Calibration Check Frequency	Post-sampling Calibration CheckFrequency	Allowable drift
Temperature	miniDOT loggers andYSI Pro DSS, or Hydrolab	°C	0.1	miniDOT ±0.15 YSI ±0.2	Per manufacturer	Per manufacturer	Per manufacturer	±0.5
Dissolved Oxygen	miniDOT loggers and YSI Pro DSS or Hydrolab optical luminescence sensor	mg/L	0.01	±0.2	1	DO loggers are factory calibrated (miniDOT); multiprobe equipment is calibrated weekly and spot checked 3x per week	6-month intervals for	±0.5 or 10%
pH	YSI, Hydrolab multiprobe	pH	0.01	±0.2	2	Per manufacturer	Per manufacturer	±0.2 units
Specific Conductance	YSI Pro DSS or hydrolab conductivity cell	µS/cm	1	±0.5%	Per manufacturer	Per manufacturer	Per manufacturer	±10%
Turbidity	Hydrolab, or other suitable measuring equipment	NTU	0.1	±1% up to 100 NTU; ±3% from 100-400 NTU; and ±5% from 400-3000 NTU	2	Per manufacturer	Per manufacturer	±0.2 or 10%
Oxidation Reduction Potential	YSI Pro DSS, or Hydrolab platinum	mV	0.1	±20	1	Per manufacturer	Per manufacturer	±10%

	button sensor							
Conventional Parameter Analyses in Freshwater								
Laboratory Quality Control		Frequency of Analysis			Measurement Quality Objective			
Calibration Standard		Per analytical method or manufacturer’s specifications			Per analytical method or manufacturer’s specifications			
Calibration Verification		Per 10 analytical runs			80-120% recovery			
Laboratory Blank		Per 20 samples or per analytical batch, whichever is more frequent			<RL for target analyte			
Matrix Spike		Per 20 samples or per analytical batch, whichever is more frequent (n/a for chlorophyll, and pheophytin <i>a</i>)			80-120% recovery			
Matrix Spike Duplicate		Per 20 samples or per analytical batch, whichever is more frequent (n/a for chlorophyll <i>a</i> and pheophytin <i>a</i>)			80-120% recovery; RPD<25% for duplicates			
Laboratory Duplicate		Per 20 samples or per analytical batch, whichever is more frequent (chlorophyll <i>a</i> and pheophytin <i>a</i> : per method)			RPD<25% (n/a if native concentration of either sample<RL)			
Internal Standard		Accompanying every analytical run as method appropriate			Per method			
Field Quality Control		Frequency of Analysis			Measurement Quality Objective			
Field Duplicate		5% of sample duplicates; if exceedance noted, duplicate is analyzed as appropriate			RPD<25% (n/a if native concentration of either sample<RL)			
Equipment Rinesate Blank		Per method			<RL for target analyte			
Nutrient Analyses in Freshwater								
Laboratory Quality Control		Frequency of analysis			Measurement Quality Objective			
Calibration Standard		Per analytical method or manufacturer’s specifications			Per analytical method or manufacturer’s specifications			
Calibration Verification		Per 10 analytical runs			90-110% recovery			
Laboratory Bank		Per 20 samples or per analytical batch, whichever is more frequent			<RL for target analyte			
Nutrient Analyses in Freshwater								

Tahoe Keys Lagoons Aquatic Weed
Control Methods Test

Reference Material	Per 20 samples or per analytical batch, whichever is more frequent	90-110% recovery
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery RPD<25% for duplicates
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD<25% (n/a if native concentration of either sample<RL)
Field Quality Control	Frequency Analysis	Measurement Quality Objective
Field Duplicate	5% of duplicates are analyzed. If exceedance noted, duplicate is analyzed as appropriate	RPD<25% (n/a if native concentration of either sample<RL)
Equipment Rinsate Blank	Per method	<RL for target analyte
Conventional Parameters in Freshwater Sediment		
Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Calibration Standard	Per analytical method or manufacturer's specifications	Per analytical method or manufacturer's specifications
Laboratory Blank	Total organic carbon only: one per analytical batch (n/a for other parameters)	<RL or 30% of lowest sample
Reference Material	Total organic carbon only: one per 20 samples or per analytical batch, whichever is more frequent (n/a for other parameters)	80-120% recovery
Laboratory Duplicate	One per analytical batch	RPD<25% (n/a if native concentration of either sample<RL)
Field Quality Duplicate	Frequency of Analysis	Measurement
Field Duplicate	5% of duplicates; If exceedance noted duplicate is analyzed as appropriate	RPD<25% (n/a if native concentration of either sample<RL)
Equipment Rinseate Blank	Per method	<RL or <30% of lowest sample

NTU: Nephelometric Turbidity

UnitRL: Reporting Limit

RPD: Relative Percent Difference

5.0 CMT DESIGN

CMT Sites/treatment types and locations of barrier curtain and monitoring stations are shown in Figure 2-1. (See Attachment C). The design incorporates several components that contribute to the validity of the resulting data:

1. Three replicated sites for each type of treatment
2. Comparisons of data between Pre-CMT conditions, CMT treatment methods and Control (untreated) sites.
3. The sites selected have comparable target plant compositions based on prior years and pre-treatment surveys in spring before treatments begin.
4. Final site selections will be made following spring surveys and to comply with NPDES requirements.
5. Double “turbidity” curtains, “Boat Barriers”, and other devices are used to separate CMT sites and will be installed strategically in order to isolate the CMT sites that will be treated with herbicides from the rest of the West Lagoon and from the West Channel which connects the West Lagoon to Lake Tahoe proper. The double curtain in Lake Tallac separates the herbicide treatment site (No. 19) from the western part of Lake Tallac which includes connections to Pope Marsh.
6. Analyzed replicated samples at a rate of 1 sample in 20 or 5%, and frequent monitoring of water quality status, multiple measurements of plant responses
7. The hydraulic status (hydraulic gradient) will be determined using well established models. (See NPDES Amendment). (See 5.1 below) Herbicide applications will be made if and only if conditions are in compliance with the NPDES.

5.1 Surface and Hydrology

To comply with the NPDES requirements that a net water inflow must be occurring during CMT herbicide applications, these conditions will be determined by reviewing well-established, current models that associate snowpack, snow-melt conditions and lake level rise. This assessment will be complemented by measuring flow in the West Channel as needed and if appropriate for conditions using sensitive flow-metering device (e.g., OTT MF Pro meter). (See Section 7.4 for measuring procedure.)

Table 5-1: CMT Water and Sediment Quality Monitoring (See summary in Attachments H-1 and H-2)

Study Component	Samples/Measurements	Timing/Frequency	Locations	Depths
Water Column Profiles	Temperature, DO (auto logging device: miniDOT)	Pre- and Post CMT: One-hour interval logging May to October, with weekly downloads	Fixed stations in CMT sites	Near surface, and near bottom
	Temperature, DO, pH, ORP, conductivity	Pre- and Post CMT. Post sampling begins 3 DAT, Three times per week between 11am and 1pm for 30 days, thereafter, once per week until November unless conditions prohibit access (e.g., ice cover).	Three Fixed stations in CMT sites; three fixed stations outside the CMT sites. Using multiprobe instruments (YSI, Hydrolab)	Mid-Depth
	Visual: Evidence of HAB conditions, then water samples for cyanobacteria/ toxin presence	Weekly if HAB species are confirmed	CMT Sites if potential HAB are visible (blooms)	At water surface
Well water sites	Raw water at well head: All functioning TKPOA potable water wells	Pre- CMT sample 24 hours before CMT starts and 48-hour intervals commencing when herbicides are applied and continuing for 14 DAT	Designated Well numbers based on actual use	Well extraction depths
Water Column Sampling	Ortho P, total P, nitrate+nitrate combined, TKN, total N, ammonia Peristaltic pumping system that can be deployed at needed depths to provide a composited sample at each CMT site.	Herbicide sites: Pre-CMT and weekly intervals beginning 7 DAT and continuing weekly thereafter. UV-only and UV-Spot treatment sites: Pre-CMT and 14-day intervals until 30 days after last UV treatment.	CMT Sites	Composite samples: surface mid depth and bottom water composite of three stations as a "Site Sample"

	Alkalinity	Weekly if Lanthanum is required.	CMT sites	Near surface and nearbottom
Study Component	Samples/Measurements	Timing/Frequency	Locations	Depths
Water Column Herbicides	Two active ingredients and major degradation chemicals (a.i.'s are triclopyr and endothall and degradants) Composited (surface, mid-, bottom) samples will be obtained using a peristaltic pumping system that can be deployed at needed depths.	Pre- CMT and 3, 4, 7, 14, and 21 day intervals commencing after herbicide applications in a site. Extended sampling, if necessary, beyond 21 DAT. Contingent sampling based on RWT and/ or herbicide detections.	CMT sites to which herbicide have been applied: Inside the site and outside in "receiving water" stations inside barrier curtains, and at "Compliance" locations outside each curtain. <u>Note: If RWT or herbicides are detected outside curtains, additional stations if herbicide residues are detected outside curtains including West Channel and station in Lake Tahoe proper.</u>	Grabs from each station will be composited: near-surface, mid-depth, and near bottom.
Sediment Herbicides	Sediments are sampling using Ponar grab or Push-core or similar sampling device that captures upper 10cm. (a.i. are triclopyr or endothall depending on site)	Pre- CMT, and 60 DAT to provide report before year 2 of CMT.	CMT sites to which herbicide have been applied 2 composited samples per site. (See Fig. 2.1)	Upper 10 cm of sediment
Turbidity	Turbidity measurements in watercolumn. YSI or Hydrolab multiprobe sensor.	During curtain installation and removal; and as part of multiprobe, 3 x per week monitoring within the CMT sites. During UV-C treatments. During installation and removal of Bottom Barriers	Curtain locations (See Fig. 2.1) and at three stations at mid-depth in each CMT site. Bottom Barrier locations: See Figure 3.4.	Mid-depth

Table 5-2: Efficacy Assessments (Target and Non-target Aquatic Plants and HAB's) (See Attachment L)

Efficacy Component (metric)	Equipment used	Metric Unit	Sampling Frequency/ method	Minimum Detection Threshold	Acceptable variation	Other metrics: Samples/ duration
<i>Species Composition</i>	Physical point sampling Double-tined rake on telescoping pole with safety floating line.	Percent of rake content; presence frequency	14 days Intervals	2 cm fragment	15%	30 collection points per CMT site
<i>Plant Condition</i>	Visual: rating scale (5=healthy;1=dead or decomposing)	Number between 1 and 5 for each sample	14-day intervals	+/- 1 rating scale unit	n/a	Based on presence in 30 sampling points per site
<i>Biovolume/plant height</i>	Lowrance 7-Acoustic Scan and transponder system	Percent cover; biovolume, plant height (ft): Digital	14-day intervals	10%-15%	See manufacturer specs.	5 min. scan over known depth area
<i>HAB potential</i>	Visual and water sample if needed	Cell/ml and level of algal toxins	Daily visual observations: visibly green zones	See HAB's laboratory thresholds And toxin ratings scale	15% based on cell counts.	Presence of cyanotoxins

6.0 SAMPLING PROCEDURES

Sampling refers to the direct grab of samples and filling laboratory-provided containers for later analysis of selected parameters. Samples collected as part of the CMT Project water quality monitoring must follow consistent sampling protocols and ensure that sampling equipment is clean and free of contaminants. Sampling protocols for maintaining proper sample handling, processing, and preservation, storage must include use of properly completed chain of custody (COC) procedures and forms. Table 6-1 describes the laboratory methods utilized for compliance with monitoring as part of the CMT.

For all types of sampling, the following standard practices apply unless otherwise stated:

- For each sampling event, the following information should be consistently, clearly and succinctly entered into a rite-in-the-rain field notebook in pencil or waterproof ink on to digital “pad” systems:
 - Date,
 - Names of field crew members,
 - Notes on weather conditions, reminders for future sampling events, safety briefings, general observations, field issues, etc.,
 - Objectives for the day (e.g., download data loggers, sonde measurements, water column turbidity measurements, chlorophyll sampling, etc.),
 - Note the time when each sampling activity begins/ends (e.g., collection of conventional parameters, filtering samples for chlorophyll analysis),
 - Tracking numbers for any samples shipped or turned over to a courier.
- All site ID names will use the following format: Site Number and Station Number (See Attachment M for sample ID’s). NOTE: Contractors may use and include separate ID codes but must provide a cross-reference those ID codes to the ID codes provided in Attachment M).
- If a boat anchor is used, samples will be collected away from the anchor to avoid any contamination from disturbed sediments. It is recommended that, if possible, avoid disturbing sediments (unless sediment sampling purposely).
- Water depth at each site will be measured prior to sampling to avoid disturbing sediments and contaminating samples.
- Following collections, samples will be stored in a cooler on frozen gel packs per recommended container, preservation and holding times in Table 6-6.
- All COC forms will be double checked against the sample bottles for completeness and accuracy and will be stored in plastic bags inside the cooler unless otherwise directed by the laboratory.
- All sample containers will be delivered to the appropriate laboratory within the required holding times identified in Table 6-6.
- At the end of each sampling event (i.e., day or series of samples in a day), a photo record of each page of the logbook, field datasheets, equipment calibration forms, COC forms, and any downloaded data will be uploaded to project files (e.g., designated Drop Box).

Table 6-1: Laboratory Methods for Sample Analysis

Analyte	Sample Matrix	Method	Method Detection Limit (mg/L)	Reporting Limit (mg/L)
Total phosphorus	SW	SM 4500-P E	0.006	0.008 NOTE for CMT this is compared to Control Site Total P (not 0.008)
Ortho-phosphorus	SW	SM 4500-P E	0.004	0.008
Nitrate+Nitrite combined	SW	EPA 353.2	0.006	0.009
TKN	SW	EPA 351.2	0.11	0.080
Total alkalinity (If Lanthanum is applied)	SW	SM 2320 B	N/A	1.0
SW = surface water				

6.1 Water Column Sampling for Nutrients

Samples at each CMT site will be comprised of a composite (from equal sample volumes) collected from near the surface, mid-depth and near bottom from three stations in each site for analysis of nutrients. Samples for nutrients will be collected weekly beginning 7 DAT and weekly thereafter in herbicide treated sites and control sites for 30 days. Samples in UV-C sites will be taken 14 DAT, and weekly thereafter until 30 days after the last UV treatment, unless conditions prohibit samplings (e.g., ice-over sites). Samples will be collected for alkalinity analysis only if conditions trigger use of Lanthanum clay product(s) (i.e., elevated total P compared with control sites AND presence of toxin forming cyanobacteria.) (See Attachments H and J).

6.1.1 Materials

1. Polycarbonate container(s) for compositing samples aliquots
2. Portable peristaltic pump and tubing and peristaltic pump system (e.g., Teflon, Tygon, silicon tubing or similar)
3. 1L or 500 ml bottles, as appropriate, provided by the analytical laboratory
4. Powder-free gloves
5. Cooler with frozen gel packs
6. WETLAB CO. COC form
7. Clear packing tape for labels
8. Pencils or Sharpie pens
9. Field notebook and datasheets
10. Laboratory-supplied sample bottles and sample preservative as needed.

Table 6-2: Conventional Parameters and Nutrients Sample Containers

Analyte	Sample Container Description	Chemical Preservative	Containers Per Sampling site/ Event
Alkalinity (For Lanthanum use only)	Plastic, 1L or 500 mL	None	TBT
Total Kjeldahl Nitrogen	Plastic, 500 mL (Separate Labeling)	H ₂ SO ₄	TBT
Total Phosphorus Nitrate+Nitrite			
Ortho-phosphorus	Plastic, 500 mL	None	TBT

6.1.2 Sample Collection (See also Attachment I)

1. Clearly and accurately complete the bottle label with the following information: Client name, Sample ID (See Attachment M), date (YYYYMMDD), and time of collection (e.g., 0900) and use packing tape to cover the label.
2. Use a rigid or weighted device to ensure the head of the peristaltic pump tube is at the proper depth.
3. Run the pump sufficiently enough to clear 2x volumes of the tubing before collecting the sample for each depth.
4. Collection consists of splitting the bulk, composited samples into separate (usually 500 ml) containers for (a) preserved samples and for (b) unpreserved samples for analysis. (See Table 6-2)
5. Between stations flush/ clear the tubing using 2x to 3x tubing volume with, DI or insert new tubing.
6. Use new tubing between those sites to which herbicides have been applied.
7. Use separate tubing for “control” sites and flush tubing with 3x the tubing system volume between sites.
8. Between Sample dates: Use new sample tubing for peristaltic pumps.
9. NOTE: Within “Control” sites: The same tubing may be used after 2-3x flushing between control sites.
10. Invert the composited container to ensure the samples are well-mixed.
11. Transfer a small amount of the sample water to the appropriate bottle per analyte and rinse (repeating twice).
12. Fill the collection bottle to below the neck and just above the shoulder to allow for any expansion during transit.

13. Duplicate samples are taken to represent 5% of totals (i.e., 1 in 20 samples) and the duplicate are analyzed as with other samples.
14. Place the bottles in a cooler with frozen gel packs. Preserved Samples: (for total P, Nitrate+Nitrite, TKN)
15. Remove the vial of acid from the sample bottle if not already present in sample bottle.
16. Transfer a small amount of the sample water to the appropriate bottle per analyte and rinse (repeating twice).
17. Fill the collection bottle to below the neck, add the vial of acid, and gently invert.
18. Care should be taken that no preservative (e.g., sulfuric acid) comes into contact with skin. Powder-free nitrile gloves must be worn to protect the skin when handling sample containers.
19. Place the bottles in a cooler with frozen gel packs.

6.2 Water Column Sampling for Aquatic Herbicides and Degradants

Composite water column samples will be collected for analysis including 5% that are duplicates, for analysis of two herbicides (endothall and triclopyr) active ingredients and their major degradation chemicals. At each of three locations (stations) in each Site, samples are taken from near-surface, mid-depth and near-bottom and equal volumes of three samples are composited to form one sample per station. Samples at the three depths are collected using a peristaltic pump system. Between each station, peristaltic tubing is flushed with 2 to 3 x the tubing volume with DI. Between each Site, new tubing is used. See Attachment H for sampling sequences. (Other contingency sampling may be required if Rhodamine WT or herbicides are detected OUTSIDE the barrier curtains, including sites in the West Channel and Lake Tahoe).

6.2.1 Materials

1. Peristaltic pump system and tubing (e.g., Teflon, Tygon, or silicon tubing or similar)
2. Powder-free gloves
3. Sufficient DI for purging/flushing pump system and tubing
4. Cooler with frozen gel packs
5. Laboratory-provided COC form
6. Clear packing tape for labels
7. Field notebook and datasheets
8. Pencils or Sharpie pens
9. Laboratory-supplied sample bottles (Table 6-3)

Table 6-3: Aquatic Herbicide Sample Containers (to completed following lab selection)

Analyte ¹	Sample Container Description ²	Chemical Preservative	Containers Per Sampling Event ¹
Endothall acid	250 ml, glass, amber	None	2 per site
Triclopyr acid	40 ml, glass amber	None	2per site
3,5,6-Trichloro-2-pyridinol (TCP)	250ml, glass, amber	None	2persite
2-methoxy-3,5,6-trichloropyridine (2-MP)	250ml, glass, amber	None	2 per site

¹ Major degradant chemicals for analysis may only require a single larger sample for all four analytes. Note: Degradant and parent analyte samples are contained in the same sample container.

² Sample containers will be determined following laboratory selection

³ 5% of Samples are taken in duplicate for analysis

6.2.2 Sample Collection (See also Attachment I)

1. Clearly and accurately complete the bottle label with the following information: Client name (Blankinship), Sample ID (See Attachment M), date (YYYYMMDD), and time of collection (e.g.,14:00) and use packing tape to cover the label.
2. Ensure peristaltic pump system has been flushed 2-3x volumes with DI between stations and that new tubing is used for each Site.
3. Lower the sample tube (with a weight or rigid frame) from the side of the boat to capture the sample from the appropriate depth (Surface, or mid-, or bottom) and pump a “clearing” volume equal to 2x the tubing volume and then collect the sample.
4. Composite the samples using a equal volume and mix in a 1 -liter screw cap polyethylene or glass container. After mixing, transfer duplicate 250 ml aliquots of the composited sample to two glass, amber bottles. For Triclopyr, 40 ml aliquots recollected in glass, amber bottles.
5. Fill the collection bottle to below the neck and just above the shoulder to allow for any expansion during transit.
6. Place the bottles in a cooler with frozen gel packs and transport for analysis.

6.3 Sediment Sampling (See also Attachment H and Attachment I)

Sediment samples will be collected at two stations in all CMT sites where herbicides have been applied. Samples will be composited with approximately equal sample volume. Samples will be collected Pre-CMT and at one post-CMT period at 60 DAT. All sediment samples will be collected from the upper 10 cm using a Push/Core sampling device or equivalent. (Note: Use of “Push/Core” sampling device may be most suitable since Ponar devices can be jammed by debris and macrophytes and prevent retrieval of a usable sample.) (See 6.3.2)

6.3.1 Materials

1. A push/core sampling device may be used to obtain sufficient sediment
2. Powder-free gloves
3. Teflon forceps
4. Stainless-steel spoons and mixing bowls
5. Sufficing DI to rinse sampling devices between stations.
6. Cooler with frozen gel packs
7. Field notebook and datasheets
8. Pencils or Sharpie pens
9. Laboratory-supplied sediment sampling containers (Table 6-6)

Table 6-4: Sediment Sample Containers

Analyte	Sample Container Description	Chemical Preservative	Containers Per Sampling Site ¹ Event= Pre/ Post treatment
Total Phosphorus (If LMCAP used)	1-8 oz. glass jar	None	2
Sediment Herbicides and Degradation Chemicals	To be determined once analytical method and laboratory are selected		2 per site

¹ Not including one field duplicate per 20 primary samples

6.3.2 Sample Collection (See also Attachment I)

1. Ensure that all surface water measurements and sample collections precede sediment sampling.
2. Proper use of Petite Ponar, or “push/core” sampling device to reach 10 cm sediment capture depth.
3. Use the Teflon forceps to remove debris (e.g., twigs, leaves, rocks, shells, etc.).
4. Using the stainless-steel spoon, place sediment into the mixing bowl to homogenize prior to placing the sediment into the laboratory provided jars.
5. Place the jars and bottles into a cooler with frozen ice packs.
6. Note sampling observations in the field logbook (e.g., number of sampler casts at each station to collect sufficient sediment volume, any problems with sample collection).

6.4 Sample Equipment Cleaning and Decontamination (See Attachment I)

To ensure samples are not contaminated between sampling events in time and space, equipment must be properly cleaned. All sampling devices should be rinsed in ambient water three times prior to collecting the final volume for transfer to individual sample containers provided by the laboratory.

Unless directed by the laboratory, sample containers without pre-filled preservatives will be rinsed three times with sample water before the bottle is capped. For sample containers with preservative provided by the laboratory, the containers will be filled directly from the polycarbonate bottle sampler, or suitable vessel, and not overfilled. Following each field event, all equipment, including multiprobe sondes, will be thoroughly cleaned to remove any attached debris or organisms that could be transported to other waterbodies and rinsed with deionized (DI) water three times (USEPA 2012).

In addition to equipment, watercraft will be cleaned to reduce risk of introducing aquatic invasive species; this includes ensuring the boat is free of aquatic plants or other debris that could transport organisms between waterbodies. Boat inspections for invasive species are required at Lake Tahoe, including the Tahoe Keys lagoons. A one-time pass (known as a “Tahoe In and Out” sticker) may be purchased that allows unlimited inspections during the calendar year (additional decontamination fees may still apply if necessary). The nearest boat inspection station to the Tahoe Keys Lagoons is the Meyers Inspection Station located at 2175 Keetak Street, South Lake Tahoe, CA. Hours of operation are 8:30 am to 5:30 pm, daily. Though the fee covers the calendar year, all boats must be inspected prior to each launch.

6.5 Sample Containers, Processing and Preservation

All samples collected for this CMT project will adhere to recommended preservation and required holding times presented in Table 6.5 to provide defensible and comparable data to meet project objectives. Specific containers, field processing protocols, and preservation methods for each analytical parameter will be determined by analytical laboratory. In general, samples are collected into laboratory- provided glass or plastic containers of appropriate volume. Each parameter has different preservation and holding time recommendations and requirements. Holding times included here are based on recommendations provided by CFR 40 Section 136, SWAMP (2017) and the identified laboratories selected for this project.

NOTE Regarding Nutrient Samples: Since holding times may be limited (e.g., 48 hours for nutrients), for nutrient samplings, the sampling day may vary 24-48 hours from “scheduled sampling” in order to ensure proper shipping in time for the sample to be received at the analytical laboratory within the 48-hour period.

Table 6-5: Summary of Recommended Containers, Preservation, and Holding Times by Analyte

Conventional Parameters in Freshwater			
Analyte	Recommended Container	Recommended Preservation	Required holding time
Alkalinity (as CaCO ₃) If LMCAP used	P	Cool to ≤ 6° C	14 Days
Hardness (CaCO ₃) (Calculated from Ca + Mg) If LMCAP used	P	Cool to ≤ 6 °C; H ₂ SO ₄ topH<2	6 months
Nutrients in Freshwater			
Analyte	Recommended Container	Recommended Preservation	Required holding time
Phosphorus (Total, as P) If LMCAP is used	P	Cool to ≤6 °C; H ₂ SO ₄ topH <2	28 days
Conventional Parameters in Freshwater Sediment			

¹ Adapted from SWAMP (2017) and modified to meet guidance provided by the selected laboratories

6.6 Sample Handling and Custody

Each sample bottle or jar will be pre-labeled with space for the following information: Clearly and accurately complete the bottle label with the following information: Client name, Sample ID (See Attachment M), date (YYYYMMDD), and time of collection (14:00). Field staff must fill out each label clearly and accurately prior to filling (when the bottles are dry) and cover the label with clear plastic tape. After collection, preservation, and securing lids, samples should be promptly stored in a plastic cooler suitable for shipping. Samples may be stored in a refrigerator before transport to the analytical lab. Samples should be stored on frozen gel packs during transport to maintain recommended preservation temperatures. Bubble wrap or other packaging may be needed to prevent container breakage.

Upon return to the boat launch site after sampling, review all labels, field data sheets, and the COC form(s) for accuracy, completeness and legibility. Inspect all sample bottles to ensure lids are tight and labels are clear. A detailed COC will accompany the sample from point of collection to disposal. COC forms should be maintained per laboratory requirements (e.g., in a Ziplock™ bag or printed on rite-in-the-rain paper).

All samples for conventional water quality parameters and nutrients will be transferred to the WETLAB courier that makes deliveries directly to the WETLAB laboratory in Sparks, NV to achieve the 48-hour-receipt deadline.

For HAB's sampling and analysis, sample will be sent to Bend Genetics in Sacramento, CA. Laboratory addresses and special shipping instructions are provided in Table 6-6.)

Table 6-6: CMT Compliance Shipping Addresses for Laboratories

Herbicide/Degradants	Nutrients
McCambell Analytical Laboratories 1534 Willowpass Rd. Pittsburg, CA 94565 Ph. 877-252-9262	Wet Lab (Western Environmental Testing Laboratory) 475 E. Greg St. Suite 119 Sparks, NV 89431
HAB samples (ID, cyanotoxins) Bend Genetics Scripps Drive, Ste. 210 Sacramento, CA 95825	

7.0 MEASUREMENT PROCEDURES

Direct measurement of ambient conditions involves the use of calibrated field equipment that is capable of logging various parameters that are later downloaded, or direct instantaneous measurements that are recorded manually on field data sheets. For this project, both approaches will be employed to capture diurnal changes throughout the study period on a limited number of parameters, but to also capture vertical changes in a broader range of parameters throughout the day. For all field measurements, equipment will be calibrated according to the manufacturer's specifications.

For all types of measurements, the following protocols apply unless otherwise stated:

- For each event, the following information should be consistently, clearly and succinctly entered into a rite-in-the-rain field notebook in pencil or waterproof ink, or in digital format using forms and menus that also include the following:
 - Date,
 - Names of field crew members,
 - Notes on conditions, issues, reminders for future sampling events, safety brief, general observations, etc.,
 - Objectives for the day (e.g., download data loggers, sonde profile measurements, water column turbidity measurements)
 - Note the time when each sampling activity begins/ends (e.g., time began/ended sonde measurements).

7.1 Water Column Measurements: Data Loggers

Mini Dot DO/temperature loggers are placed at each CMT site to record data from surface and bottom of the water column. Loggers will be set to monitor each parameter at one-hour intervals and downloaded weekly from May to November.

Maintenance activities such as cleaning and replacement will occur according to manufacturer's specifications.

7.1.1 Materials

1. Chains (steel, galvanized), ½ cinderblocks Spectra line, buoys, carabiners, bolts to produce the mooring device to anchor the loggers securely and permit their detachment for downloading.
2. MiniDOT loggers, factory calibrated; deployed at 12-18 inches below the surface and 12 -18 inches from the bottom.
3. Cable to interface loggers with laptop/ computer software for downloading.
4. Replacement caps and maintenance kit
5. Field notebook and datasheets
6. Pencils or Sharpie pens

7.1.2 Deployment, Downloading and Maintenance Procedures

1. At first deployment, check the temperature sensors against a National Institute of Standards and Technology (NIST) certified thermometer (USEPA 2012), or use standard ice/bath method.
2. Before deployment and each downloading event, check the date & time on the field computer and update it to the correct date & time as necessary.
3. Before deployment and each downloading event, check and reset personal/field watches to the correct date and time, so that field watches match the field computer's date & time.
4. Note in the field datasheet the time when loggers were removed from the water, record the logger serial numbers, and keep the logger running with 60-minute interval measurements.
5. Refer to the manufacturer's guidance for downloading instructions.
6. Exterior of loggers should be labeled either "T" or "B" to ensure their consistent placement at the surface (top) or near the bottom of the sampling mooring site: The serial number of each logger should be identified with a sample station (mooring) and whether it is designated as the "Surface/Top" or Bottom" placement in the station mooring system.

7. Use logger software to graph data for inspection of anomalies that could indicate fouling or poor calibration.
8. Before returning the miniDOTs to the water, verify that the cover is snugly in place but not over tighten and that the sensor is clear of debris such as algae, sediment or other materials that could interfere with accurate DO sensing.
9. Record in the logbook the time when the loggers are returned to the water.

7.2 Water Column Measurements Inside CMT Sites.

Multiparameter Sonde (3x per week, 11am-2pm): Mid-Depth. See also Figure 2.1, Attachment H)

A multi-probe, water quality meter (sonde) will be used to measure temperature, DO, pH, temperature, ORP, conductivity, turbidity from May through November at all CMT sites. Note: Information on water depth should be obtained prior to deployment to ensure the sonde is read at mid-depth.

The user's manual includes calibration and maintenance instructions. A calibration worksheet (log) should be maintained that documents date of calibration and name of person doing the calibrations.

7.2.1 Materials

1. YSI ProDDS or Hydrolab multiparameter water quality meter with a cable labeled in one-foot increments; or use a
2. Depth finder, or lead line
3. Calibration standards and calibration documentation form:
Use pH 4, pH 7, pH 10 calibration standards
4. Field notebook and datasheets
5. Pencils or Sharpie pens

7.2.2 Measurement Procedures

1. Calibrate according to manufacturer's instructions weekly before use. Use pH, pH 7, pH 10 standards and conduct "spot" check 2x per week on two different days using a pH 7 standard: If reading varies more than 0.3 pH units, recalibrate
2. Calibrate DO (dissolved oxygen) using manufacturers protocol and recommended frequency.

3. Check the water depth at each station using a depth finder, or lead line, or weighted multiprobe sonde.
4. Gently lower the sonde such that the probes are at the “Mid-depth” at three stations in the CMT sites for reading/recording data.
5. Allow all parameters to stabilize before recording measurements on the field data sheet. (Typically, 2 min.)

7.3 Ambient Turbidity Measurements (Measure at mid-depth 3x per week at each CMT site between 11:00am to 2:00pm)

Turbidity in the water column will be measured at each CMT site (three times per week) and at the curtain installation and removal sites. (See Figure 2-1; Attachment C)

7.3.1 Materials

1. Depth finder, lead line
2. Plastic container for capturing water from the sampler and transferring to the sample cell
3. Turbidity probe on YSI, or Hydrolab
4. Lint-free cloth
5. Extra batteries
6. Field notebook and datasheets
7. Pencils or Sharpie pens

7.3.2 Measurement Procedures

1. Calibrate the turbidimeter according to manufacturer’s guide.
2. Using the calibrated multiprobe (YSI or Hydrolab) Determine turbidity at mid- depth at three stations in each CMT site.

7.4 Water Column Measurements OUTSIDE CMT sites

Multiparameter Sonde (3x per week, 11am-2pm/ Option 10am to 3 pm as needed): Mid-Depth. (See “Yellow dots”, Fig. 2.1).

Follow protocols for calibration and measurement of pH and DO, and temperature in section 7.2, above.

7.5 Hydraulic Flow Condition Assessments and Measurement

7.5.1 Utilize Current Weather/ Snowpack/ Snow Content Modeling

Utilize current snowpack /snow melt/ snow water content modeling to provide estimate of lake level rise and hence flow to the West Lagoon areas such as USGS models and predictive inflow to Lake Tahoe. The model will be accessed daily to provide trend in lake level and filling rates as it pertains to, and indicates inflows to the West Lagoon.

7.5.2 Supplement Model Using Acceptable Devices (digital flow meters such as OTT MF Pro meter).

Measurements should be taken during a 2-hour period before initiating herbicide applications. If representative flow is inward (toward the Keys Lagoons), Lahontan will be notified by “email” that the conditions are acceptable to begin herbicide applications planned for that day. At initiation of herbicide application, additional flow measurements are taken at least hourly until the last herbicide application for the day is completed. The average flow during the application period will be reported to Lahontan within 24 hours of herbicide application.

7.6 Fresh Weight of Macrophyte Rake Samples

Measuring Fresh Weight of SAV (Submersed Aquatic Vegetation) on CMT Rake Samples

7.6.1 Introduction

The three- year CMT project has utilized several methods to determine the effectiveness of the various treatments (Group A Treatments: Herbicides alone, Herbicide/UV Combination, UV alone, LFA alone; and Group B Treatments: Bottom Barriers, UV-Spot treatments; Diver Assisted Suction Harvesting (“DASH”). The methods include: (1) hydroacoustic scans (and derived “Biovolume” and “Plant Height” used to assess “Vessel Hull Clearance”; and (2) Physical rake samples from which are derived the following: “Rake Fullness” (what proportion of the sampling rake is covered in total plants on the rake; “Frequency of Occurrence by species (how often is each species found on rake samples); and “Relative Abundance” (an estimate of how much (“abundance”) of each species is represented by the “Rake Fullness” ranking. The relative abundance metric provides an estimate not only of what species are most represented in rakes samples, but their relative contribution to the overall total SAV abundance in a given rake sample. In addition to these metrics, the relative “health” (condition) of each species on a rake sample is recorded (5= healthy; 1= dead/decomposing). In Year 3, the fresh weight of plants on rake samples may be recorded in selected sites and on selected dates in order to determine if fresh weight and rake fullness are well correlated (See Section 7.6.2)

7.6.2 Purpose of Fresh Weight Measurement

By the end of CMT Year 3 monitoring, the rake sampling for treatment effects on macrophytes will have resulted in over 25,000 data points. In order to provide an estimate of SAV rake-fresh weight, we need to determine a statistical relationship between “Rake Fullness” rankings and fresh weight of total plants in rake samples since “Rake Fullness” includes all species present on the rake. CMT Year 3 macrophyte assessments protocol is therefore being augmented by recording a “Fresh SAV Weight” measurement for at least 20 rake samplings events during each of three seasonal periods: Early Summer (June); Mid-Summer (Early August) and late Summer (end of September) and represent a range of rake fullness. The three sampling periods in total should provide a total of 60 fresh weights and 60 “Rake Fullness” rankings.

Since the “Rake Fullness” values will each have an associated “Fresh Weight”, a correlation coefficient can be determined that describes the relationship between the two measurements, and how much variation is present. With this result, the prior Rake Fullness values can be used to estimate fresh weights from previous samples in all three CMT project years- and future similar monitoring.

7.6.3 Methods

1. The standard methods for obtaining macrophyte rake samples are used (See QAPP), including “Rake Fullness”.
2. Once the plants are removed from the rake for ID and species recorded, the entire sample is place in a 2.5 gal. or 5.0 gal pail with perforated bottom (1/8 -1/4 dia holes, or a screen with similar mesh openings).
3. Whichever pail is used, its weight without plants or water is recorded using the digital suspension scale (See model below). OR- the pails can be “tared” (Zero weight showing on the digital scale) before each rake/plant sample is placed in the pail.
4. Once in the pail, plants are allowed to drain 1 minute and record the fresh weight. Be sure the fresh weight is recorded as associated with the other metrics for the same rake sample.

7.6.4 Precautions

1. If rake samples pull up mud or other “non-plant” debris (dead branches, clams, etc.), remove these so that the plants are “clean”.
2. Keep the “drip time” as uniform as possible; if there is a reason it is delayed more than 90 sec., note the reason.

3. Check the digital scale for accuracy at least twice a day during use: hand a known weight (e.g. 200g or 500g) and record the weight). Note any deviation of more than 5%. NOTE: Keep the pail out of the wind and as “steady” as possible during weighing.
4. Check battery condition (4 C batteries) before each day's use and have four backup C batteries onboard.

7.7 Turbidity During UV Treatments

Measurement of Turbidity and Transmissivity During UV Light Treatments

7.7.1 Introduction and Purpose

The effectiveness of UV-C exposures in controlling aquatic plants depends on adequate UV-C energy absorbed the plant surfaces (leaves and shoots) that will kill the plant or at least kill the plant tissues that are exposed to the UV-C irradiance. The UV-C energy reaching the plants surfaces is affected by (1) the distance from the UV source (UV light arrays) to the plant surfaces; (2) transmissivity of UV-C light through the water (which is affected by turbidity and dissolved organic matter); and (3) duration of UV-C exposure at a specific treatment location (i.e. where the UV-array is positioned). Of these variables, only distance to the plants surfaces and duration of exposure can be adjusted under field conditions (assuming the UV-C array output is constant and known.) However, turbidity and transmissivity of UV can be easily measured in the field and may provide metrics that help determine the duration of UV-C exposure needed for effective treatments. (Dissolved organic matter (DOM) is likely to affect UV-C transmissivity but DOM requires laboratory instrumentation.)

The purpose of this protocol is to obtain data that will help determine if there is a relationship between turbidity and UV-C efficacy. By measuring turbidity during UV-C treatments the levels (NTU) may be correlated with subsequent measurements of efficacy determined by hydroacoustic scans and physical rake sampling at specific CMT UV-only treatment sites or UV-Spot Treatment areas.

7.7.2 Instrumentation

Turbidity meters vary considerably in cost but those employing simple cuvette sampling methods, and standard solutions for calibrations are the least expensive. More expensive instruments measure turbidity directly in the water at a given depth, such as the multi-sensor “sondes” that have a dedicated turbidity sensor. However, the less expensive “cuvette” type meters can be used to measure turbidity at the depth where the UV array is deployed if water at depth and location is pumped on-board and used in the cuvette-type meter. A simple 12-volt bilge pump with a tube, attached to a pole is adequate and provides sufficient volume to obtain the water sample-at depth- quickly.

Regardless of the turbidity measurement, the instruments must be calibrated at least daily.

Transmissivity measurement is used to determine the output (UV-C energy) from the UV-C LED lamps. This can detect if there has been a reduction in energy due lamp wear or buildup of surface material on the lamps lenses.

7.7.3 Field Protocol for Turbidity and Transmissivity Measurement and Data Recording

Turbidity

1. Before beginning each day of UV Site treatments, Calibrate the meter according to the manufacturer's instructions while on site. Have sufficient, available DI (distilled water) as a blank and for rinsing the cuvettes before and after each measurement.
2. Determine the depth where the UV array will be operating and pump water from that depth for sufficient time to pump three volumes of the tubing system before collecting the sample for measurement of turbidity. Collected in a clean beaker sufficient sample to make three separate turbidity measurements. Record three separate turbidity measurements. Triple rinse cuvettes with DI between measurements.
3. **Complete steps 1,2 before beginning the UV Array treatments.**
4. At the end of the treatment for a site (or Group B UV Spot treatment) repeat Steps 1 and 2 for an "End of Treatment" turbidity measurement. This method results in two turbidity measurements: beginning and end of site treatment.
5. **Use the online Dropbox folders/files to upload the following information, in addition to the standard pre-field, field forms, treatment forms:**
 - a. Site or Spot Treatment Area Designation
 - b. Date and start and end treatment time for the entire UV site or Group B Spot treatment area.
 - c. Depth of array (if there are multiple depth list the range) and depth where water was pumped from to measure turbidity and transmissivity.
 - d. Duration of treatment for each "array setting" (i.e. how long was array used (minutes) each time it was re-positioned?). If this was a uniform duration state that.
 - e. Turbidity at the start of the treatment (list all three separate measurements)
 - f. Turbidity at the end of the treatments (list all three separate measurements)
 - g. Transmissivity (three separate measurements) as a "percent" transmittance.

- h. Comments or notes on any measurement problems or events that may have affected turbidity or transmissivity.

7.7.4 Timing and Frequency of Turbidity/UV measurements.

1. Timing at each Site/Group B area:
Measure turbidity at the start and completion of a UV- Site Treatment (Spot or UV-only or UV Combo). (For example: Day 1 Start; Day X end of treatment in the site or/ Group B area.
2. Number of Sites/ Group Areas: Record Turbidity at each UV-treatment or Group B area.
3. Schedule for turbidity measurements:
Mid-June, Early August (First week), Mid-September.
4. Note: If UV is used after removal of BB's, record turbidity at start and end of UV treatments.

Transmissivity

1. Ensure that the transmission detector is properly calibrated and designed for UV-C wave lengths.
2. Develop a system of tracking (labeling) the LED's so that the same lamp(s) can be measured repeatably of over time.
3. Measure the UV LED lamp output at a standard (uniform) distance between the lamps and detector.
4. Measure sufficient number of lamps to obtain an average energy output ;
5. Develop and define a minimum energy output above which the lamp output is acceptable to use.
6. Develop a frequency for measuring transmissivity that will capture typical "life-time" of adequate UV-C output before either cleaning or replacement is required.
7. Log all measurements and cleaning or replacement of LEDs.

7.8 Species-Specific Biovolume

7.8.1 Purpose

Several different metrics are used to determine the effects of the various CMT methods on AIP including rake samples and hydroacoustic scans. The hydroacoustic scans provide overall “biovolume” percent data but do not distinguish species or separate the relative contribution of each species to the overall level (percent) biovolume. However, by using both rake data, which provides species abundance and frequency of occurrence and hydroacoustic scan done at or near the same time as rake sample, an estimate of the species-biovolume can be calculated. This estimate is useful to understand how the changes in the three target AIP species affect overall biovolume, and how CMT methods may alter how each species affects overall biovolume. Also, because there is historic data from both rake data and hydroacoustic scans in mid-summer, multiyear trends can be revealed (pre-CMT and during the 3-year CMT).

7.8.2 Calculation Method

To calculate frequency of occurrence, the species presence/absence data derived from physical rake samples is used to determine the number of samples that contain each species. The resulting value is then divided by the total number of rake samples. While these values (percentages) can provide information on the distribution of each species in the lagoons, they do not represent the relative abundance totaling 100% but instead represent frequency of occurrence for each sample dataset.

Relative biovolume by species is calculated by extracting hydroacoustic scan biovolume percent data at all macrophyte sampling locations using ArcGIS Pro Spatial Analyst. The biovolume percent values produced from the hydroacoustic scans are calculated by dividing plant height and water depth and multiplying the resulting value by 100 for each location along a traveled path. The rake data gives species composition at the points where hydroacoustic scan biovolume data were obtained. Biovolume per data point (%) and species composition (%) are then multiplied to form relative biovolume for each data point per species (see Figure 7-1).

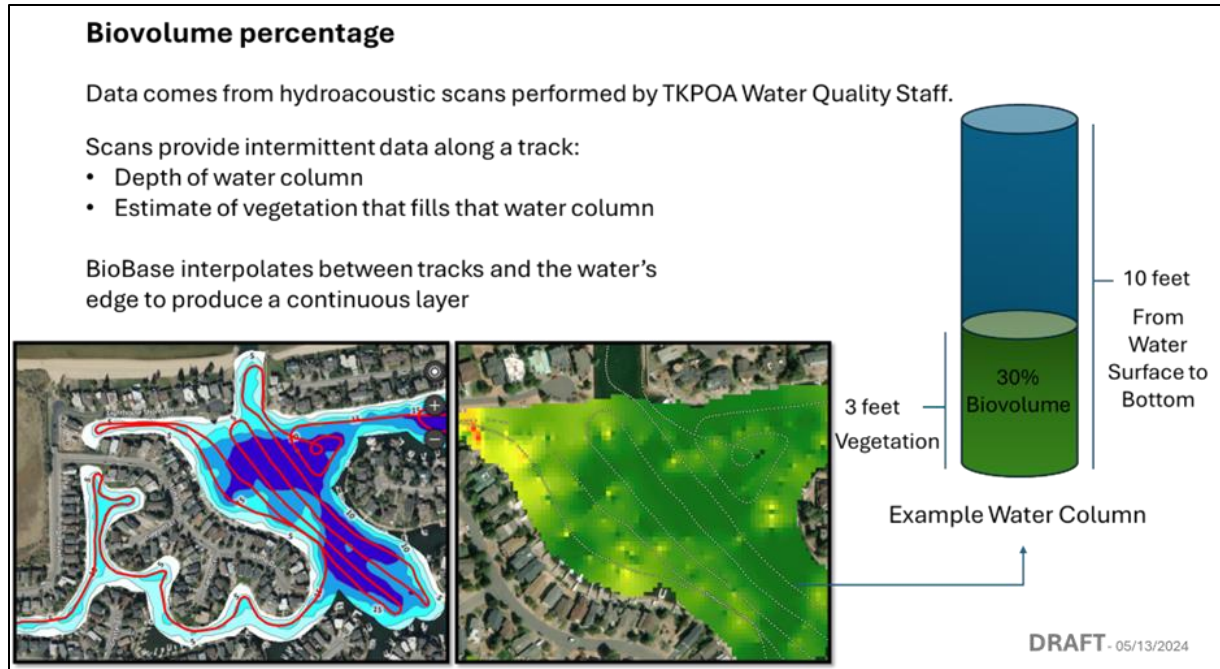


Figure 7-1. Biovolume obtained from hydroacoustic scans and generated through a commercial mapping service (BioBase).

The calculations for species- specific Biovolume and Estimated cubic yards by species are summarized here as a two-step approach.

Step 1:

$$\begin{array}{|c|} \hline \text{Biovolume per Data} \\ \text{Point (\%)} \\ \hline \text{(Hydroacoustic Scans)} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Species Composition} \\ \text{(\%)} \\ \hline \text{(Macrophyte Data)} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Relative Biovolume} \\ \text{per Data Point per} \\ \text{Species (\%)} \\ \hline \end{array}$$

Step 2:

$$\begin{array}{|c|} \hline \text{Average Biovolume per} \\ \text{species present (\%)} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Water Volume per} \\ \text{Lagoon(cu yd)} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Absolute Biovolume of} \\ \text{each species (cu yd)} \\ \hline \end{array}$$

It should be noted that this method for estimated species cubic yards can only be used when there is close proximity in time (within a few days) and location (with a few yards) for both rake samples and hydroacoustic scans, and when the water volume is known. Fortunately, hydroacoustic scans generally encompass the entire areas where rake samples are taken, and scanning tracks can be used to delineate polygons encompassing the rake sample areas.

8.0 QUALITY CONTROL PROCEDURES

Quality control procedures will be implemented in the field and in laboratories to maintain, evaluate, and document the accuracy, precision, and bias in implementing sampling and analytical methods. The following sections discuss methods for verifying field data collection, proper sample management, collection of field quality control samples, and laboratory quality control analyses and procedures.

8.1 Quality Control in Sampling

Several steps will be taken to maintain a high level of quality control during the field collection of water and sediment samples and during the measurement of water quality constituents and water levels.

1. Accurate field notebook or digital entries and log form records will be maintained that track sample identification, the times when different sampling activities are started and completed, and any variations from planned procedures. Field records will be cross-checked for accuracy and completeness before leaving each sampling site.
2. All field equipment that comes in contact with water or sediment samples will be thoroughly cleaned before use to prevent contamination of samples. Sampling equipment will be cleaned according to the procedures described in Section 6.7.
3. Samples will be placed into certified clean bottles or jars that are provided by the laboratories. Laboratories will also provide any chemicals to be added to samples for preservation.
4. Sources of extraneous contamination will be minimized during sampling. Powder-free latex gloves will be worn during sample collection.
5. Equipment rinseate blanks for peristaltic pumping system will be submitted at a frequency of one per sampling event (or date), to determine if sampling equipment or containers are introducing bias to the sample results. Rinseate blanks will be collected by running deionized water through sampling equipment in the same way that site water samples are collected. Blanks will be used to determine whether the sampler, sample containers, preservatives, or transport methods are a source of bias in sample results. If bias is detected in blank sample results early in the project, additional steps will be taken to isolate the source of contamination, and field procedures or equipment may be modified to eliminate the problem.
6. A field duplicate sample will be collected to represent 5% of the samples collected. Duplicates will be collected immediately after primary samples and serve as an indication of overall precision in the sampling and analysis process, including variability inherent in the sample medium. The 5% duplicates will be analyzed as with the other samples.

7. Chain-of-custody procedures will be followed for all samples from the period of sample collection through receipt at the laboratory. Field records will be cross-checked for accuracy and completeness before leaving each sampling site.

8.2 Quality Control in Field Measurements

Field instruments will be calibrated and maintained according to manufacturer specifications, using fresh calibration standards. Calibration instructions for the miniDOT data loggers, YSI and/or Hydrolab multi-sensor sondes. Calibrations will be fully documented on calibration forms. Accurate field notebook entries and log form records will be maintained to document the starting and ending time of measurements, results, and any deviations from planned procedures. Data loggers will be downloaded to a computer and graphed to verify that the files contain complete records and to identify any nonperformance that requires corrective action and redeployment.

8.3 Sampling and Field Measurement Corrective Actions

Corrective actions will be taken as necessary by field personnel to address problems that occur during field sampling and data collection.

1. Laboratory calibrations of data loggers will be performed as necessary, based on the results of field calibration checks.
2. When different equipment is used for turbidity measurements, a comparison of the equipment readings will be made using a common turbidity standard solution. Any discrepancies between equipment in "standard" readings shall be noted and adjustments will be made to correct measurements based on standards. If differences between equipment are consistent (e.g. NTU always consistently above or below) the standard, a constant correction factor may be applied. For turbidity measurements during UV-C treatments, the purpose is also to detect if there are differences between the start of the treatment and end of the treatments.
3. At the completion of profile measurements at each station using the multi-sensor sonde, the measurements will be repeated at the first measurement depth and compared with initial measurements to see if MQOs for allowable drift are met. Sensors will be recalibrated, and all profile measurements will be repeated at that station if excessive drift is detected.
4. Depending upon equipment, Dissolved oxygen membranes will be replaced as needed, and at least once every two months. (NOTE: miniDot do not require this.)
5. The peristaltic sampling systems will be checked for leaks/tubing breaks at each sampling event.

All problems and corrective actions will be documented in field notes and discussed with the Principal Investigator. Technical support at the manufacturer will be contacted as

necessary for troubleshooting and resolving any performance issues with the data loggers, multiprobe sondes, and sensors. Spare pH and DO data loggers, and a spare YSI or Hydrolab multi-sensor sonde will be available in proximity to CMT sites so that data collection can continue if an instrument requires factory servicing.

8.4 Laboratory Quality Control

Western Environmental Testing Laboratory (WETLAB) is certified under the California State Environmental Laboratory Accreditation Program (ELAP) for analyzing the nutrients and conventional water quality parameters required by this QAPP. Their routine laboratory quality control procedures will be adequate to evaluate laboratory accuracy and precision for this project. Duplicate sample analyses will be performed on 10% of samples, and method blanks (matrix dependent), laboratory control samples (LCS), matrix spikes (MS), and matrix spike duplicates (MSD) will be analyzed as part of the methods performed routinely. Laboratory duplicates, LCS, MS, and MSD analyses will be used to estimate the precision and accuracy due to the combination of the analytical procedure and matrix interferences. Laboratory blanks will be used to measure the response of the analytical system at a theoretical concentration of zero, and to check for laboratory contamination

McCandless Laboratory will conduct herbicide/ degradant sampling.

This QAPP will be updated to include information on laboratory quality control procedures for herbicide chemical analyses after the test methods and selection of laboratory have been completed.

9.0 DATA MANAGEMENT PROCEDURES

Data for the project will be generated by recording field measurements, by electronic field instrumentation, and by laboratory instrumentation. Specific procedures will be implemented for each type of data to ensure that they are accurately transferred or downloaded for data storage, management and analyses, as described in the following sections.

9.1 Field Data Management

Hand-written field data from data log forms will be photographed in the field to generate backup files and then transferred to electronic format upon return from the field. Data that are needed to track individual samples and merge with analytical data (e.g., sample number, location, date, etc.) will be entered into a spreadsheet. Field data entry will be reviewed at a rate of 100%. If errors are found in the first check, then the entries will be fully checked again until no errors are found. Electronic data files from recording instrumentation (i.e., data loggers, multiprobe sondes) will be transferred directly to Excel spreadsheets.

9.2 Laboratory Data Management

Raw data generated in the laboratories are electronically entered and stored in a Laboratory Information Management System (LIMS), or similar data storage and retrieval system. In the LIMS the data are reviewed for quality assurance and reports are electronically generated. The laboratory will also provide files that are automatically converted to Excel spreadsheets so that data entry and transcription errors can be avoided. Copies of both the LIMS pdf files and Excel spreadsheets will be archived as received from the laboratory.

10.0 DATA VERIFICATION AND VALIDATION

10.1 Laboratory analyses: Before submitting data packages to contract manager, all laboratory data will undergo a quality assurance review by laboratory staff to compare quality control (QC on laboratory reports) and sample results to the acceptance criteria specified in the standard operating procedure for each analytical method. Appropriate qualifiers will be attached to results that did not meet acceptance criteria, and re-analyses will be performed as required by the method. Data qualifiers will be described in a case narrative that is part of each data package.

After receipt of the verified data from laboratories, the CMT Project Assurance Manager will evaluate the data for project use by reviewing the results of QC samples against the MQOs for bias, precision, and accuracy. Data will be reviewed for outliers or abnormalities and double-checked as necessary against field notes, previous data trends or supporting raw data.

Overall precision will be estimated by calculating the relative percent difference (RPD) between results for field duplicate samples. RPD is calculated by dividing the difference between the two values by the average of the two values. The RPDs provide an indication of the random variability in the sampling and analytical procedures. These values will be compared to MQOs for overall precision. The RPDs for duplicate concentrations at or near the reporting limit are typically higher but are small in absolute terms and will not be used to reject data as unusable.

Analytical bias is assumed to be within acceptable limits if laboratory QC limits are met for blanks, MS and MSD samples, and LCS. Sampling bias will be evaluated by verifying that the correct sampling and handling procedures were used, and by confirmation that results for field blank analyses were less than reporting limits. Overall accuracy will be estimated by comparing LCS results with known concentrations, and to a lesser extent by recovery of MS and MSD samples. Percent recovery is calculated by dividing the LCS, MS, or MSD analysis result by established control standard or spiked concentrations.

10.2 Field Measurements (Multiprobe sondes; miniDOT loggers). Quality assurance review of field measurements will consist of reviewing results weekly to identify outliers and abnormalities and comparing results between data loggers and sondes for temperature, DO, and pH and other variables as appropriate. Anomalous data will be

checked for causality and if recalibrations are not successful, back up equipment will be used. If needed, we will compare miniDOT logger data with data from freshly calibrated handheld sonde units to determine validity of loggers with. Comparing data logger results recorded near the same time and depth of profile sonde measurements will also be used to help identify anomalous values that may be rejected as unusable.

Compliance with required monitoring will be determined by daily verifications of monitoring activities.

Data verification and validation results will be included in the data report prepared for the CMT project annual report which is due March 1 of the year following CMT activities. These results will include explanations of any qualifiers attached to sample results by the laboratory during data verification, or by the Contractors' Data Quality Assurance Manager during data validation, including the rationale behind rejecting any data as unusable. Data verification will be reviewed by CMT Project managers/ contract managers.

11.0 DATA QUALITY ASSESSMENT

The goal of the CMT monitoring is to provide scientifically valid data related to CMT treatments and their effects compared to both Pre-CMT conditions and compared to conditions in Control (untreated) sites. Also, to assess data quality, for example, water quality data obtained during the CMT will also be compared to prior year(s) data for similar dates, times and conditions, particularly in the CMT control sites as these conditions are likely to be more similar to prior year water quality conditions.

12.0 DOCUMENTATION AND REPORTING

Documentation of the CMT will include original field notes, photographs, field forms and instrument calibration records, laboratory data packages that include completed chain-of-custody forms, and electronic files from water quality data loggers, water level recorders, and a rain gauge. All of the information will be summarized in a data report, with written records provided in appendices. The data report will be provided to individuals on the distribution list as electronic pdf files. Photographs, laboratory data packages, and electronic files from water quality and hydrology instruments will be made available electronically on portable file storage devices. Any updates to this QAPP will be attached and emailed to individuals on the distribution list. The contracting project manager will archive all of the electronic project files for at least 10 years.

The data report prepared for this study will provide much of the information used to evaluate CMT and evaluate water quality compliance in an antidegradation analysis; however, the data report will not include these evaluations and analyses. Data analyses and interpretation included in the data report will include comparisons of results to Basin Plan water quality objectives, estimating a seasonal water balance for the lagoons, and preparing a conceptual model that describes nutrient loading to and nutrient cycling within the Tahoe Keys lagoons.

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Attachment A

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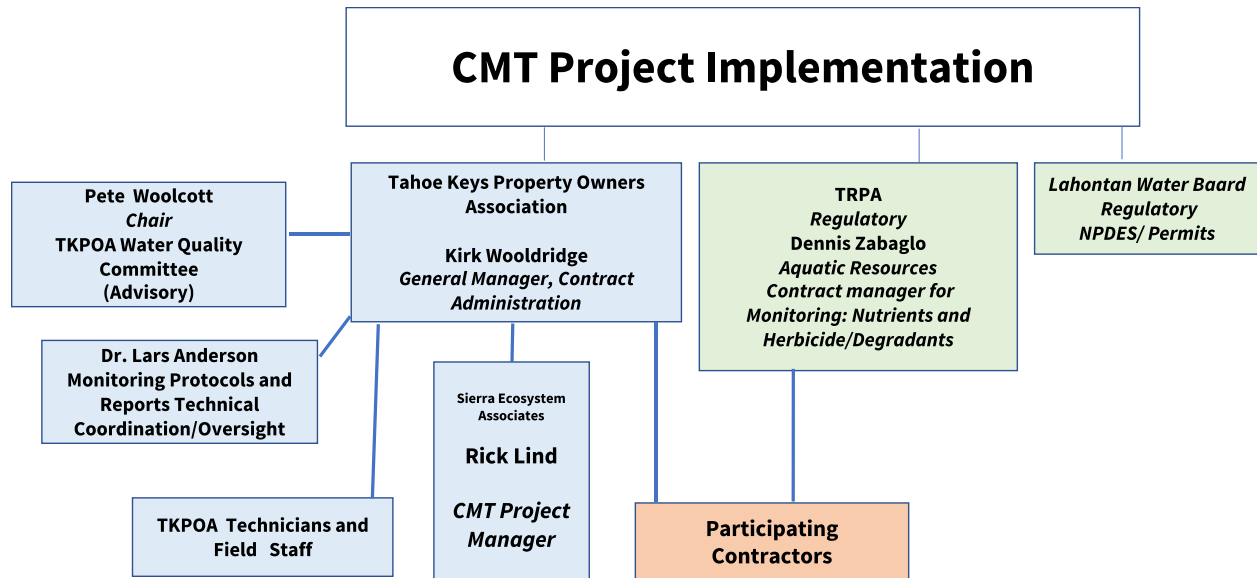
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Attachment B. CMT Project Organization: Graphic



Attachment C. Map of CMT Sites



Attachment D. BMPs for Selected Actions

CMT/BMP: Installation and Removal of Double Barrier (“turbidity”) Curtains

A. General Risk Considerations

The primary hazards associated with double curtain (turbidity curtain) installation and removal are: (1) Diver safety and; (2) disturbance of benthic environment including elevation of turbidity above background levels.

B. Avoidance of Hazard

Diver safety. Only divers with current SCUBA certifications for high-altitude diving will be deployed to install and remove curtains. Divers will work in pairs with at least a third person onshore to assist and communicate with divers in the water. Only divers (and associated crew) with prior experience installing and removing turbidity curtains will be utilized for these actions. All diving gear and associated equipment will be checked for proper working condition before installation or removal of curtains is begun. The lead diver (supervising diver) shall provide a written record documenting training, experience at least 30 days before curtains are installed. Lead (supervising diver) shall maintain a written record documenting specific equipment checks at the end of each dive day and present this record to the CMT project manager within 24 hours after each dive/ working day.

C. Protection of benthic environment and minimizing elevated turbidity

1. At least 20 days before installation of curtains, Divers will inspect the areas where curtains are to be installed and will note the nearest access points for curtain staging.
2. At least 20 days before curtain installation, Divers shall perform a pre-installation inspection of the benthic areas above which the curtains will be deployed and to which the bottom of the curtains will be affixed using weights, and at the side-points where curtains will be anchored.
3. During installation of curtains Divers shall minimize their contact with the benthic areas as much as possible and shall minimize the contact of curtains with the benthic area except where the bottom edges are to be anchored. Divers will enter the water outside the areas where curtains are to be installed so as not to disturb the bottom until curtains are positioned to be installed. This can be accomplished by “floating” the curtains to the installation site or transporting on vessels to keep the curtains from dragging on the bottom.

4. Assessing turbidity: During installation and removal of curtains, turbidity will be measured and recorded at mid-depth within 25 ft from either side of the installation point at 60 min. intervals.

D. Mitigation of elevated turbidity

If turbidity exceeds the pre-installation levels by greater than 15%, installations shall be paused until turbidity decreases to no more than 15% pre-installation levels. Turbidity levels shall be measured 24 hr after completion of installation or removal and levels will be recorded. If turbidity exceeds pre-installation levels by more than background 24 post- installation or removal, the Water Board shall be notified immediately.

**CMT/BMP: Timing of Herbicide Application to Prevent Migration of Herbicides
(Water flow and Physical containments)**

A. General Risk and Herbicide Movement Considerations.

The primary hazard for contact with herbicides is direct dermal contact, ingestion or inhalation of vapors from the undiluted, concentrated packaged products (e.g. containers with either liquid or granular formulation of herbicides). After the herbicide products are applied in the CMT sites and become diluted to target concentrations, per label instructions and PPE compliance, the hazard from contact is negligible. The typical dilution and mixing period is 24-48 hours in the CMT sites based on prior RWT movement studies in 2009, 2011.

The first step in assuring that herbicides remain in the designated CMT site is that they are correctly applied only to those sites designated for herbicide applications. The BMPs for herbicide rate and applications reduces the risk that herbicide will be either mis-applied or that herbicide will be applied outside the designated site (see separate BMP: Herbicide Rate/Application).

B. Specific BMPs Designed to prevent migration or herbicides.

1. Hydraulic components and water flow. The timing of herbicide application in the CMT sites will be contingent upon presence of a net water flow from Lake Tahoe proper into the West Keys Lagoon via the West Channel. The measurement of water movement (direction and velocity) will be done using a fixed-station ADPC (using doppler principle to detect and measure particles in water) device. The ADPC will be programmed to assess water velocities and direction at least at 60 min. intervals for a period of 10 min. This data will be downloaded daily to provide a record of flows within the West Channel. This data will be reviewed in concert with hydrologic models that incorporate snow melt and predicted levels in Lake Tahoe.

NOTE: Historic Lake Tahoe levels suggest that this net flow (filling the Keys) spans March to Mid-June/Mid July depending upon winter snowpack and rate of snowmelt.

Redundancies for water flow measurements: (a) In addition to the ADPC device, water flows may also be assessed daily using underwater videography. Plants are easily affected by water currents and reflect the direction of water movements; (b) hand-held or boat-mounted flow meters may be used daily from an anchored vessel: Measurement will continue for 30 min at mid-day.

2. Direct impedance to migration: Installation of double solid curtain barriers. Prior to application of any herbicides, two, solid fabric “turbidity” curtains will be installed at strategic locations to isolate CMT-herbicide and CMT-Herbicide/UV-C combination sites from the main part of the West Lagoon and thus prevent a connection (migration pathway) to Lake Tahoe. Barriers will remain in place for 21 days or until herbicide residues are below effective levels and are below MCL’s
3. Natural “half-life” of herbicides. By using “only sufficient amount of herbicide to accomplish the CMT goals” (Per EPA guidance), the starting (i.e., highest concentration of herbicides) are as low as possible to provide needed efficacy. This BMP results in the degradation of herbicides more quickly to below MCL levels more quickly than if the herbicides were used at or near the maximum allowable rates and thus greatly increasing final CMT site water concentration. The outcome of this BMP is to decrease the likelihood of herbicide residues migrating out of the CMT sites and exceeding receiving water limitations.
4. Use of surrogate dye to detect migration of herbicides. Although this BMP cannot by itself stop herbicide migration, the use of Rhodamine WT dye provides an “early warning” signal that can indicate movement of herbicides from the CMT sites. The use of this surrogate provides a contingency trigger that would cause further monitoring of sampling stations outside the barrier curtains.

CMT/BMP: Herbicide and Rhodamine WT (RWT) Rate Determination and Applications:

Use of minimum herbicide concentration needed
Tracing of potential herbicide movement using RWT

A. General Herbicide and Rhodamine WT Rate Considerations and Calculations.

1. For any active ingredient (solute) concentration in an aqueous solution, to achieve 1 ppm requires 2.71 lbs per acre-feet (acre-ft). For example, to produce a 1ppm concentration in a 1-acre site that is 15 ft deep (=15 acre-

ft) would require: $2.71 \times 15 = 40.65$ lbs. To produce 2.0 ppm requires 81.3 lbs.

2. For the CMT sites, the volume (acre-ft) of water will depend on the bathymetry (depth contours). The depth contours may be determined by two methods:
 - a. hydroacoustic scans (sonar-scans that allow calculation of depth contours and volume); or
 - b. physical depth measurements using hand-held depth finder and calibrated pole in each CMT site (herbicide alone and in the dock-to-shore zones for the combination sites.) For physical measurements, typically 50 to 60 measurements are taken to encompass the deep and shallow zones and the volume is then calculated based on the proportion of the site for deep areas (typically middle) and near shore area.

Note: For the combination sites, the total acre-ft to which herbicides are applied will be relatively small compared to the volume of the entire site. For example, a typical combination site volume to which herbicides are applied would be 2.5 to 3.5 ac-ft.

Bathymetry will be determined within 15 days before projected herbicide applications.

3. Determining correct amount of formulated herbicide product. Herbicide products typically have different formulations with varying percent of active ingredient (either by weight or per gallon). The three products planned for use in the CMT include the following with examples of calculations used:
 - a. Renovate 3: active ingredient is 3 lb/gal.
Therefore, for a 15 acre -ft site to achieve 1 ppm active triclopyr:
 $15 \times 2.71 = 40.65$ lb/ 3 lb/gal = 13.55 gal. of Renovate 3 for the site.
 - b. Renovate OTF: 10% active ingredient by weight. (i.e., the product is 90% inert).
Therefore, for a 3 acre-ft combination site to achieve 1 ppm:
 $3 \times 2.71 = 8.13$ lb/0.1 = 81.3 lb product.
 - c. Cascade: active ingredient (endothall, K salt) 4.23 lb/gal.
Therefore, for a 15 acre-ft site to achieve 2 ppm endothall:
 $15 \times 2.71 \times 2 = 81.3$ lb/ 4.23 = 19.22 gal. of product.
4. For Rhodamine WT: The product dye is concentrated and the amount of rhodamine per liter is provided. The same principles used for herbicide: Bathymetric data (volume) is used to calculate the amount of RWT product

to produce a range of 5 to 10 ppb (parts per billion) as a final target concentration.

NOTE: The actual final amounts of herbicides will be determined by the bathymetry used to calculate the volume of water to which herbicide are to be applied.

B. Herbicide and Rhodamine WT Storage and Handling BMPs.

1. Only the QAL certified applicator and their staff under the QAL supervision will handle the undiluted product. Undiluted product will be stored by the QAL apart from the working locations of TKPOA staff and the public. NOTE: Under the training requirements and CEU (Continuing Educational Units) to qualify for an Applicator License (and specific requirements for aquatic pesticide application), personnel must pass certification examinations and maintain their license through on-going CEU credit.
2. For a given day of application, only the amount of unopened herbicide product to be used will be staged at the TKPOA shop area or will be transported by the QAL directly to the vessel loading sight(s). (See attached map.) In all cases, only the QAL or QAL supervised staff will transport product to the vessel loading site.
3. Only sufficient herbicide product to be applied to a single CMT site will be loaded onto the application vessel. However, when replicate sites are within close proximity, the total amount of herbicide product for all replicates of the same product may be loaded on the application vessel.
4. QAL shall record the amount of product loaded on the application vessel as well as the "Lot No." of the product.

NOTE: Since Rhodamine WT dye is NOT a pesticide, it does not have to be applied by a QAL (Certified applicator). However, since RWT will be mixed with the liquid formulation of herbicides, these mixtures (and applications) will be done by a QAL.

For RWT applied separately in sites to which Renovate OTF applied, RWT may be applied by a non-QAL, or may be applied under the supervision of a QAL.

C. Herbicide and Rhodamine WT Application BMPs.

1. Label Compliance. Herbicide product labels provide detailed directions, limitations, required PPE and application equipment and methods (See attachments: product labels). All applicable labeling and label directions shall be reviewed at least 45 days before anticipated application date. By 30 days before anticipated herbicide or RWT application, QAL shall

document review of the labeling and review of labeling by all staff under the supervision of the QAL.

2. QAL license. At least 45 days before scheduled applications, the applicator shall provide current QAL and written description of experience in applying the specific herbicide products and /or Rhodamine WT. (NOTE: This requirement is also in the RFPs for application of herbicide.)
3. Equipment Condition and Calibration. (NOTE: TKPOA staff shall inspect vessels to verify the compliance with the following.)
 - a. Application vessels. All vessels used for application of herbicide or Rhodamine WT shall be in good working, sea-worthy condition, and shall display a current registration. All vessels shall have on board sufficient pfd's for all crew, at least one anchor and 50 ft of anchor rode, both bow and stern dock lines, an air-horn warning device. Power for the vessel may include a 4-cycle inboard outboard motor, or electric motor. Vessels must have onboard absorbent materials to contain and sorb small spills of gasoline, herbicides or Rhodamine WT, and closed empty container into which absorbed spills may be deposited temporarily.
 - b. Before any herbicide or Rhodamine WT is loaded onto application vessels, any equipment used for liquid or granular applications must be tested for proper operations using plane water or solid materials (for granular applications). Testing must be conducted with normal operating pressures used during actual application operations.
 - c. Calibration. Prior to applications, all application equipment and application systems must be calibrated using tap water (for liquid application), or granular "blanks" for granular formulations. Calibration should include rates and pressures proposed to be used for the CMT sites (either full or partial "Combination" sites).

QAL shall provide a written record of calibration results at the end of each day of application.

4. Application Methods. Applicator (QAL) shall provide for local logistics planning at least 20 days before anticipated application. The QAL shall provide the following:
 - a. Type of application equipment to be used for each product
 - b. GPS equipment to be used to establish and record application "tracks"

- c. Method of loading product onto application vessel
- d. Method of calibration to ensure accurate application (See 3.c above).
- e. Method(s) of cleaning equipment between CMT site (e.g., flushing system within CMT treatment site; closing valves to prevent “leakage” in transit between sites).
- f. Communications plan between QAL and their staff, contact names and phone (cell) numbers for TKPOA staff, TRPA representative and Lahontan Water Board contact).
- g. Contingency plan to report spills, misapplication events or other incidents that may cause unpermitted release of herbicides. **NOTE: Any such event must be reported immediately to TKPOA, TRPA and Lahontan Water Board contacts and to any designated contingency spill clean-up contact resources.**
- h. **Description and verification of proper disposal of empty herbicide and/or Rhodamine WT dye containers (NOTE This is the responsibility of the QAL).**

CMT/BMP: Staff Training: Avoidance of Harm from Herbicides and RWT

A. General Risk Considerations.

The primary hazard for contact with herbicides is direct dermal contact, ingestion or inhalation of vapors from the undiluted, concentrated packaged products (e.g., containers with either liquid or granular formulation of herbicides). After the herbicide products are applied in the CMT sites and become diluted to target concentrations, per label instructions and PPE compliance, the hazard from contact is negligible. The dilution and mixing period are 24-48 hours in the CMT sites based on prior RWT movement studies in 2009, 20011.

B. Avoidance of Harm.

To avoid direct contact with undiluted herbicide product, only the certified applicator and their staff under the QAL supervision will handle the undiluted product. Undiluted product will be stored by the QAL apart from the working locations of TKPOA staff and the public. NOTE: Under the training requirements and CEU (Continuing Educational Units) to qualify for an Applicator License (and specific requirements for aquatic pesticide application), personnel must pass certification examinations and maintain their license through on-going CEU credit.

C. Field operations and training.

At least 30 days prior to applications of herbicides or RWT, TKPOA staff will be trained in use of protective gloves, precautions and identification of CMT sites that are scheduled to receive any herbicide applications. Regardless of the dilution status in CMT sites, TKPOA staff shall wear Nyltex or equivalent gloves when performing water sampling or other water-contact activities within CMT sites for a period of 21 days post applications, or until the barrier curtains are removed.

D. General public contact.

As part of the CMT mitigation compliance, TKPOA will have installed several systems to restrict public access to, and thus contact with herbicides at levels that could pose a hazard. These restrictions to the public, and related information include:

1. Physical exclusion of recreational boating inside the CMT sites that will contain herbicide or RWT using barrier curtains and other physical impedance to enter CMT sites.
2. Educational and informational outreach to TKPOA homeowners and the public through the TKPOA normal correspondence (Newsletter) and through specifically targeted communications to homeowners whose homes are within the CMT sites.
3. Highly visible signage and warning language directly placed outside and adjacent to the CMT sites to which herbicide and RWT are to be applied.

Attachment E. Daily Log Form (Template)

CMT Year 3 End of Day Google Form

Daily updates to all monitoring associated activities for the CMT. These forms will be compiled and used to track progress during Year 3 (2024).

A new form is required to be submitted for each crew, per activity performed, per day.

Please complete and submit this form within 24 hours of data collection.

* Indicates required question

1. Email *

2. Full name of person completing this Google Form: *

3. Organization: *

4. Date of Monitoring: *

Example: January 7, 2019

5. Start time of monitoring: *

Example: 8:30 AM

6. End time of monitoring: *

Example: 8:30 AM

7. Have all personnel completed the required training and orientation? *

Mark only one oval.

☐ Yes

☐ No

CMT Treatment

Please indicate which treatment type the monitoring activity falls under.

8. CMT Treatment (Check all that apply) *

Check all that apply.

- ☐ UV-C Only (Group A) Sites 22, 23, 24
- ☐ Laminar Flow Aeration (Group A) Sites 25, 26, 27
- ☐ Herbicide Only (Group A) Sites 1, 2, 3, 5, 8, 9, 19, 21
- ☐ Herbicide / UV-C Combo (Group A) Sites 10, 11, 12, 13, 14, 15
- ☐ Control Sites 7, 16, 17, 18, 20
- ☐ DASH (Group B)
- ☐ Bottom Barriers (Group B)
- ☐ UV-C Spot Treatment (Group B)
- ☐ Other: _____

Summary of CMT Monitoring Action(s)

9. Crew Lead *

10. Monitoring Activity *

Mark only one oval.

- ☐ BMI Sampling
- ☐ Bottom Barriers - Install
- ☐ Bottom Barriers - Repairs
- ☐ Bottom Barriers - Removal
- ☐ Continuous WQ Monitoring
- ☐ Cyanobacteria and/or Nutrient Sampling
- ☐ DASH - Treatment
- ☐ DASH - Turion Counts
- ☐ Herbicide Sediment Sampling
- ☐ Hydroacoustic Scans
- ☐ Macrophyte Sampling
- ☐ Muck Depth Monitoring - Staff Gages
- ☐ Muck Depth Monitoring - Steel Plates
- ☐ Muck Depth Monitoring - Mesh Bags
- ☐ Nutrient Grab WQ Sampling
- ☐ PAR - Light Level Monitoring
- ☐ PAR - Profiling
- ☐ Percent Organic Sampling
- ☐ Standard WQ Monitoring
- ☐ Turbidity Monitoring - DASH
- ☐ Turbidity Monitoring - BB
- ☐ UV-C Application - Group A
- ☐ UV-C Application - Group B
- ☐ Other: _____

11. List all sites monitored *

12. Did you observe any injured, trapped, or dead wildlife or waterfowl that you observed? If yes, please describe.

13. Did you encounter any uncooperative members of the public? If yes, please describe.

14. Did you observe of paint/start of cyanobacteria growth? If yes, please describe.

15. Recommendations, if any.

Verification of Compliance with QAPP Action 17

Action 17. Vessel Maintenance and Repair and Use

TKPOA boats used for CMT need to be fully operational, numbered or otherwise clearly identified and inventoried on a Vessel Use Log (VUL). The purpose of the VUL is to identify and coordinate locations, dedicated use(s), condition (operational status), operators and R&M schedules.

Vessels used for water sampling (e.g., nutrients and standard water quality such as YSI or Hydrolab use) can be powered by standard 4-cycle (or approved systems), electrical outboards (e.g., Torqeedo). The rationale for electric outboards is to minimize potential "water transfer" (via engine cooling systems) between CMT sites, and to maximize ease in controlling vessel positions, and to eliminate staff exposure to exhaust during site monitoring activities. However, sampling behind (inside) curtained zones will be done using boats that DO NOT launch into area outside the curtains in order to eliminate boat/water contamination outside the curtains. During Pre-treatment sampling, and when curtains are removed, all vessels are allowable in all CMT sites for remainder of monitoring activities.

The following tasks ensure boat utility, safety and operational readiness

- A. Safety and Contingency Resources. All vessels must be inspected daily before and after use for integrity of hull, drive systems (motors/steering), and containment of the following:
1. dock lines in good condition
 2. Sound (acoustic) warning device in working condition (air horn and whistle)
 3. Flashlight in working condition
 4. Bailing pail or hand operated pump
 5. Sufficient battery/ fuel to complete daily tasks
 6. Clean decks and cockpits- free of debris that could create tripping or slipping hazard
 7. Absorbent mats for spills
 8. Anchor and sufficient rode (ca. 50 ft) appropriate for the vessel size.
 9. PFD's sufficient for operator and any passenger staff (See 3 QAPP Action 18 below regarding operator and passenger responsibilities)

16. All Action 17 requirements met? *

Mark only one oval.

☐ Yes

☐ No

17. Describe deficiencies, if any.

18. Deficiencies noted and corrected?

Mark only one oval.

☐ Yes

☐ No

Verification of Compliance with QAPP Action 18

Action 18. Vessel Operator (VO), Crew Safety

The vessel operator ("driver") is responsible for inspection of vessel condition and having required safety and contingency equipment and supplies on board before leaving a dock area. All VO's will have been trained on the equipment for the type of vessel used. All VO's will have in their possession a current California Boater Card.

A. VO Responsibilities:

1. VO will review safety measures with all passengers/crew before leaving dock.
2. VO will review with the crew the daily task(s) and estimated time on the water.
3. VO will ensure that ALL on board are correctly wearing a suitable PFD before leaving the dock.
4. VO will ensure that a working cell phone is accessible on board with pre-programmed number for the CMT Project Manager. (This may be in possession of the VO and/or any Crew).
5. VO will determine if conditions (weather, crew, equipment, vessel) are suitable and safe for completing the daily task(s) and can abort the daily work if conditions change from suitable and safe to unsafe or that present unreasonable or likely risks to anyone on board.
6. Upon return to dock, VO will complete a Vessel Exit Log (VEL) that documents any problems, needed R&M and recommendations for improvements in vessel operations and readiness. The VEL will be provided to the CMT Project Manager: by hard-copy or digitally and forwarded to the CMT Project Manager as an email attachment on the same day as the vessel was in operation by the VO.

B. Crew and Passenger(s). Anyone on board will either be part of the work-day crew, or potentially a passenger responsible for QA/QC oversight. Both crew and passenger(s) must abide by the VO's directions and assist in VO's inspection of safety equipment, proper PFD use and safety reviews before leaving the dock. On-water time is costly and usually time-sensitive, and therefore it is essential that proper preparations for daily vessel/crew operations are thorough so that time on the water is efficient, safe and productive.

1. Passengers/Crew will properly wear appropriate PFD's before leaving the dock.
2. Passengers/ Crew will ask the VO for any clarifications needed for the daily task before leaving the dock.
3. Passengers/Crew will inform the VO that all supplies, materials, and equipment are on-board and in working order before leaving the dock. The daily task will not begin, and vessel will remain at dock until all necessary supplies, materials, and equipment in working order are on board. Passenger(s)/Crew will provide the VO with a checklist that documents that all necessary supplies, materials and equipment needed for the daily task(s) are on board.

4. Passenger(s)/Crew will immediately inform the VO if they become aware of any potential unsafe or hazardous conditions, before leaving the dock or at any time during the daily task(s) operations.

5. Passenger(s)/Crew will inform the VO if anyone onboard is ill, in stress or otherwise unable to carry out their responsibilities.

6. Upon completion of the daily task(s), and arrival at dock, Passenger(s)/Crew will assist the VO in unloading equipment, cleaning and clearing decks and cockpit areas free of debris and hazards.

19. All Action 18 requirements met? *

Mark only one oval.

☐ Yes

☐ No

20. Describe deficiencies, if any.

21. Deficiencies noted and corrected?

Mark only one oval.

☐ Yes

☐ No

Verification of Daily Activities

22. Does the information provided on this Google Form match the Pre-field Checklist *
uploaded to Dropbox (i.e., activities, sites, training)? If not, explain below.

23. If changes are necessary to this Google Form, I will revise this form and not *
submit a new one.

Mark only one oval.

☐ Yes

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Google Forms

ESA | Environmental Science Associates In-field Forms (Templates)

BMI DATE

Created	DATE, TIME UTC by STAFF NAME
Updated	DATE, TIME UTC by STAFF NAME
Location	LATITUDE, LONGITUDE
Status	☐ New

General Information

Pre-Field Check List	
Name of who submitted Pre-field Checklist	
Date	
Start Time	
Crew	
All staff have reviewed safety information?	Yes/No

SITE NAME

Site Number
Site Start Time
Site End Time

Water Quality Information

Equipment Used	MAKE, MODEL
WQ Time	
Water Temperature (C)	
Dissolved Oxygen % Saturation	
Dissolved Oxygen (mg/l)	

BMI Samples

Subsite

BMI Sample Time	
Subsite	
Relative Location	Shoreline/Mid-Channel
Depth (ft)	
Substrate	Sandy/Boulder/Gravel/Vegetated/Silt
Turions Observed?	Yes/No
NZMS observed?	Yes/No
End of Day Google Form	
Name of Who Submitted End of Day Google Form	
End of Day	

CMT_Macrophytes_Year3

42f571ec-76b5-4a62-86d4-6e4d45baf3c1

CMT_Macrophytes_Year3

Tahoe Keys Control Methods Testing Year 3 (2024) macrophyte sampling

DATE, BOAT NAME

DATE, TIME PM UTC



CREATED

- 🕒 DATE, TIME PM UTC by
- 👤 STAFF NAME

UPDATED

- 🕒 DATE, TIME PM UTC by
- 👤 STAFF NAME

STATUS

- New

LOCATION

- 📍 LATITUDE, LONGITUDE

Fill out a Pre-Field Checklist

Pre-field Checklist	
Name of who submitted Pre-field Checklist	
Date	
Start Time	
Boat Name	
Crew	
All staff have reviewed safety information?	Yes/No
Gear inspected for NZMS?	Yes/No

Site Visit

Site Visit - Site Name

Site Name	
Start Time	

Macrophyte (Rake) Sample

Macrophyte (Rake) Samples

Group B Method	
Rake Subsite	
Relative Location	Shoreline/Mid-Channel
Depth (ft)	
Rake Photos	

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

CMT_Macrophytes_Year3

42f571ec-76b5-4a62-86d4-6e4d45baf3c1

Rake Biomass Fullness (%)	0% no plants or ONLY filamentous algae present; 1-5%; 6-25%; 26-50%; 51-75%; 76+%
Plant Species	Eurasian watermilfoil (Myriophyllum spicatum), Curlyleaf pondweed (Potamogeton crispus), Coontail (Ceratophyllum demersum), Richardson's pondweed (Potamogeton richardsonii), Leafy pondweed (Potamogeton foliosus), Elodea canadensis (Elodea canadensis), Elodea nuttallii (Elodea nuttallii), Watershield (Brasenia schreberi), Yellow pond-lily (Nuphar polysepala), Nitella., Chara, Najas, White water buttercup, Water smartweed (Polygonum amphibium), Variable leaf pondweed, Bladderwort, Sago pondweed, Sagittaria, Spirogyra, filamentous algae, Northern watermilfoil (Myriophyllum sibiricum), Andean watermilfoil (Myriophyllum quitense), Quillwort (isoetes), White water-crowfoot (Ranunculus aquatilis)
Eurasian watermilfoil Relative Abundance	
Eurasian watermilfoil Rating Score	
Is Eurasian watermilfoil flowering?	
Curlyleaf pondweed Relative Abundance	
Curlyleaf pondweed Rating Score	
Is Curlyleaf pondweed flowering?	
Turions Observed?	
Coontail Relative Abundance	
Coontail Rating Score	
Is coontail flowering?	
Richardson's pondweed Relative Abundance	

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

CMT_Macrophytes_Year3

42f571ec-76b5-4a62-86d4-6e4d45baf3c1

Richardson's pondweed Rating Score	
Is Richardsons pondweed flowering?	
Leafy pondweed Relative Abundance	
Leafy pondweed Rating Score	
Is Leafy pondweed flowering?	
Elodea canadensis Relative Abundance	
Elodea canadensis Rating Score	
Is Elodea canadensis flowering?	
Elodea nuttallii Relative Abundance	
Elodea nuttallii Rating Score	
Is Elodea nuttallii flowering?	
Watershield Relative Abundance	
Watershield Rating Score	
Is Watershield flowering?	
Water smartweed Relative Abundance	
Water smartweed Rating Score	
Is Water smartweed flowering?	
Yellow pond-lily Relative Abundance	
Yellow pond-lily Rating Score	
Nitella Relative Abundance	
Nitella Rating Score	
Chara Relative Abundance	
Chara Rating Score	
Sagittaria Relative Abundance	
Sagittaria Rating Score	
Spirogyra Relative Abundance	
Spirogyra Rating Score	
filamentous algae Relative Abundance	
filamentous algae Rating Score	
Najas Relative Abundance	
Najas Rating Score	
Variable leaf pondweed Relative Abundance	
Variable leafy pondweed Rating Score	
White water buttercup Relative Abundance	
White water buttercup Rating Score	

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Tahoe Keys Lagoons Aquatic Weed Control Methods Test

CMT_Macrophytes_Year3

42f571ec-76b5-4a62-86d4-6e4d45baf3c1

Bladderwort Relative Abundance	
Bladderwort Rating Score	
Sago pondweed Relative Abundance	
Sago pondweed Rating Score	
Northern watermilfoil Relative Abundance	
Northern watermilfoil Rating Score	
Andean watermilfoil Relative Abundance	
Andean watermilfoil Rating Score	
Quillwort Relative Abundance	
Quillwort Rating Score	
White water-crowfoot Relative Abundance	
White water-crowfoot Rating Score	
Total Abundance	
Fresh Weight lbs (only for subset of rakes)	
Rake Notes	
Plant Photos	
End Time	
Field QC of Rake Locations	
Site Notes	
Site Photos	

Visual Observations

NZMS Observed?	Yes/No
Harmful Algal Bloom Observed?	Yes/No
Dead Fish Observed?	Yes/No
Live Fish Observed?	Yes/No
Plants growing to the water surface (e.g., topped out)?	Yes/No
Are observed plants flowering?	Yes/No
Are plant fragments present?	Yes/No
Filamentous algae present?	Yes/No
Cyanobacteria present?	Yes/No
Water appears to be turbid?	Yes/No

Tahoe Keys Lagoons Aquatic Weed
Control Methods Test

CMT_Macrophytes_Year3

42f571ec-76b5-4a62-86d4-6e4d45baf3c1

Daily Notes (changes from plan, weather conditions)	
End of Day Google Form	
Name of Who Submitted End of Day Google Form	
End Time	

NUTRIENTS, DATE, BOAT NAME

Created	DATE, TIME UTC by STAFF NAME
Updated	DATE, TIME UTC by STAFF NAME
Location	LATITUDE, LONGITUDE
Status	☐ New

General Information

Fill out a Pre-field Checklist

Pre-field Checklist

Name of who submitted Pre-field Checklist

Gear inspected for NZMS?	Yes/No
--------------------------	--------

Date

Start Time

Crew

All staff have reviewed safety information?	Yes/No
---	--------

Boat Name(s)

Nutrients

SITE NAME

Site Name

Group B Method

Sample Type	Primary/Duplicate/Rinsate Blank
-------------	---------------------------------

Site Start Time

End Time

Subsite

Subsite

Total Depth (ft)

Surface Sample Depth (ft)

Mid Sample Depth (ft)

Bottom Sample Depth (ft)

Photo of Nutrient Bottles

All equipment rinsed BEFORE leaving site?	Yes/No
Visual Observations	
NZMS observed?	Yes/No
Harmful Algal Blooms Observed?	Yes/No
Dead Fish Observed?	Yes/No
Live Fish Observed?	Yes/No
Plants growing to the water surface (e.g., topped out)?	Yes/No
Are observed plants flowering?	Yes/No
Are plant fragments present?	Yes/No
Filamentous algae present?	Yes/No
Cyanobacteria present?	Yes/No
Water appears to be turbid?	Yes/No
End of Day Google Form	
Name of Who Submitted End of Day Google Form	
End Time	

Attachment F. Herbicide Application Schedule

Site Number	Treatment	Proposed Herbicide	Application Date	Application Day
8	Herbicide only	Triclopyr	5/25/22	1
9	Herbicide only	Triclopyr	5/25/22	1
15	Combination	Endothall	5/25/22	1
No Applications			5/26/22	
1	Herbicide only	Endothall	5/27/22	2
2	Herbicide only	Endothall	5/27/22	2
3	Herbicide only	Endothall	5/27/22	2
No Applications			5/28/22	
5	Herbicide only	Triclopyr	5/29/22	3
10	Combination	Endothall	5/29/22	3
11	Combination	Endothall	5/29/22	3
No Applications			5/30/22	
12	Combination	Triclopyr	5/31/22	4
13	Combination	Triclopyr	5/31/22	4
14	Combination	Triclopyr	5/31/22	4
19 (Lake Tallac)	Herbicide only	Endothall	5/31/22	4

*Note: This schedule is based on first applications starting on May 25, 2022. If environmental conditions in the CMT project area prohibit starting on this date, a re-adjusted schedule will be provided. However, the relative sequence of applications, including No Application days will be sustained to provide for required field monitoring activities. Conditions that could alter this schedule include Weather (rain, snow, hail, high winds), or unforeseen equipment problems, or hydrologic conditions that are not in compliance with the NPDES permit.

Attachment G. Spill Prevention and Response Plan

SPILL PREVENTION AND RESPONSE PLAN

Tahoe Keys Property Owners Association Tahoe Keys Lagoons Aquatic Weed Control Methods Test



PREPARED BY:



STRATUS ENGINEERING ASSOCIATES LLC

**3330 CAMERON PARK DR, SUITE 850
CAMERON PARK, CALIFORNIA 95682**

MAY 2022

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FIGURES

- Figure 1 Control Methods Test Final Treatment Sites
Figure 2 Boat Storage, Launching, and Mooring

APPENDICES

- Appendix A Daily Field Report/Spill Report Form Safety Data Sheets
Appendix B Safety Data Sheets
Appendix C Spill Response Equipment Specifications/Process Flow Diagram



1. FACILITY INFORMATION

<i>Project Name</i>	Tahoe Keys Property Owners Association Tahoe Keys Lagoons Aquatic Weed Control Methods Test (CMT)
<i>Facility Location</i>	Tahoe Keys 356 Ala Wai Blvd, South Lake Tahoe, CA 96150
<i>Facility Operator/Owner</i>	Tahoe Keys Property Owners Association 356 Ala Wai Blvd, South Lake Tahoe, CA 96150
<i>Contact Information</i>	Kirk J. Wooldridge PCAM®, AMS®, CMCA®, CCAM®, CHA®, General Manager Tahoe Keys Property Owners Association 356 Ala Wai Boulevard, South Lake Tahoe CA 96150 530-542-6444 Extension: 224 530-541-2521 FAX kwooldridge@tahoekeyspoa.org



2. INTRODUCTION AND PURPOSE

The Tahoe Keys Property Owners Association (TKPOA) has consulted with various agencies and other stakeholders to design and test the use of Federal and California Environmental Protection Agency (EPA) approved chemical control methods to manage the aquatic weed problem within the water in the Tahoe Keys West Lagoon and Lake Tallac, South Lake Tahoe, California, and meet the objectives of its Waste Discharge Requirements (WDRs). The Control Methods Test Project (CMT) was developed by collaborative stakeholders and TKPOA to address these issues. The CMT will test standalone as well as combination types of treatments in select test sites within the Tahoe Keys Lagoon using herbicides, ultraviolet (UV-C) light, and Laminar Flow Aeration (LFA) as a means of managing the aquatic weed problem. At the direction of Lahontan Regional Water Quality Control Board (Water Board), this Spill Prevention and Response Plan (Plan) was developed for use during the CMT in the Tahoe Keys. This Plan will be used to prevent and/or respond to spills of substances containing active herbicide chemicals in locations not expressly permitted by the Water Board through their Order No. R6T-2022-0004 NPDES NO. CA6202201 WDID NO.6A091701001).

3. EMERGENCY NOTIFICATION AND AGENCY CONTACTS

CMT PROJECT CONTACTS

Primary

Name:	Rick Lind	Office Number: 530-622-8740
Title:	Project Manager	Cell Number: 530-400-0850

Secondary

Name:	Dr. Lars Anderson	
Title:	Monitoring/Technical Direction and Oversight	Cell Number: 916-715-7686

Additional

Name:	Kirk Wooldridge	Office Number: 530-542-6444
Title:	TKPOA General Manager	

Additional

Name:	Dennis Zabaglo	Cell Number: 530-545-1370
Title:	TRPA Aquatic Resources Program Manager	Office Number: 775-589-5255

Additional

Name:	Steve Sweet	Cell Number: 775-220-4607
Title:	TRPA Code Compliance Program Manager	Office Number: 775-589-5250



SPILL RESPONSE CONTRACTORS

Liquid/Granular Spill in Water During CMT

Contractor:	Stratus Engineering Associates LLC	Office Number: 530-651-4200
Contact:	Rob Kull	Cell Number: 530-672-4017

Liquid/Granular Spill in Vessel

Contractor:	Aqua Technex	Office Number: 360-527-1271
Contact:	Terry McNabb	Cell Number: 360-201-4017

Liquid/Granular Spill on Land

Contractor:	Stratus Engineering Associates LLC	Office Number: 530-651-4200
Contact:	Rob Kull	Cell Number: 530-672-4017

ADDITIONAL

Name:	Dennis Zabaglo	Cell Number: 530-545-1370
Title:	TRPA Aquatic Resources Program Manager	Office Number: 775-589-5255

ADDITIONAL

Name:	Steve Sweet	Cell Number: 775-220-4607
Title:	TRPA Code Compliance Program Manager	Office Number: 775-589-250

AGENCY CONTACTS

California Office of Emergency Services	800-852-7550
Lahontan Regional Water Quality Control Board	530-542-5400
Lahontan Water Board Executive Officer, Mike Plaziak	530-542-5412
United States Coast Guard	800-323-7233
Department of Fish and Game (impacts to water body)	916-385-2900
El Dorado County Environmental Management (CUPA)	530-621-5300
Fire Department (City of South Lake Tahoe) or 911	530-542-6160
Police Department (City of South Lake Tahoe) or 911	530-542-6100
Tahoe Regional Planning Agency	775-588-4547
California Department of Public Health	916-558-1784
South Tahoe Public Utility District (STPUD)	530-544-6474



4. MANAGEMENT APPROVAL

This Plan discusses spill prevention and best management practices, spill response, and oversight of the CMT. This Plan has been compiled, reviewed and certified by a professional civil engineer (third party) licensed in the state of California. A copy of this Plan will be maintained at the TKPOA and Contractor offices, reviewed and followed by the TKPOA contractor(s) retained to apply herbicide chemicals and respond to spills, and made available upon request for on-site review by regulatory agencies.

The TKPOA is committed to protecting public health and the environment and maintains the highest standards for spill prevention and response through implementation of the approved Aquatic Pesticides Application Plan (APAP), and regular review, updates, and implementation of this Plan, as required. This Plan has the full approval of management at a level of authority necessary to commit the required resources to fully implement the Plan.

Kirk J. Wooldridge PCAM®, AMS®, CMCA®, CCAM®, CHA®, General Manager

Signature _____

Date _____

Plan Distribution

Copies of the Plan are kept on file by the TKPOA:

- Office, 356 Ala Wai Blvd, South Lake Tahoe, CA 96150
- <https://www.keysweedsmanagement.org/blog/aquatic-pesticide-application-plan-apap-amendment-1-for-the-control-methods>

5. SPILL PREVENTION RESPONSE ROLES AND RESPONSIBILITIES

Oversight of the chemical application activities will be conducted by an Environmental Program Manager (EPM) with 40-hour HAZWOPER training certification per 29 CFR 1910.120 and 29 CFR 1926.65. The EPM must be familiar with spill prevention and response to ensure the procedures outlined in this Plan are adhered to, and to document a spill should one occur. The EPM must be familiar with the requirements of Order No. R6T-2022-0004, NPDES Permit No. CA6202201 (Order) and comply with the conditions of the Order as necessary. The EPM will provide written and photo documentation of daily field and spill response activities. See Appendix A for the Daily Field Report and the Spill Report Form.

The EPM will be responsible for holding a daily operations meeting to ensure all personnel involved in the chemical application process are educated on the CMT activities to be conducted and the associated spill prevention and response measures as outlined in this Plan. The EPM will observe spill prevention and best management practices during CMT activities outlined in Section 6 of the Plan. The EPM has the authority, in conjunction with the CMT Project Team (Section 3 of the Plan), to pause or halt CMT activities should conditions arise that the EPM determines has the potential to cause a spill on land, on board the application vessel, or within the water of the



Tahoe Keys Lagoons. All parties involved in the CMT activities have the authority to stop work if unsafe conditions are observed.

The EPM will be responsible for oversight of spill response for each of the scenarios provided below:

5.1. Spill Prevention and Response on Land Conveyance

The EPM will be responsible for spill response activities should a spill occur on land and will provide spill response and best management practice (BMP) materials. The EPM will ensure the spill has been mitigated and that all used/spent spill response materials and BMPs are properly disposed in accordance with Local, State, and Federal requirements. Spill response activities for spills on land are described in Section 7.2 of this Plan.

5.2. Spill Prevention and Response on Application Vessel

The EPM will be responsible for providing oversight should a spill occur within the application vessel. The EPM will ensure that spill response and BMP materials are provided by the contractor selected to apply the chemicals (Applicator) and maintained on the application vessel before the vessel leaves the dock, that the spill has been properly mitigated by the Applicator, and that the used/spent spill response material/BMPs are properly contained and disposed. Spill response for spills on the application vessel are described in Section 7.3 of this Plan.

5.3. Spill Prevention and Response on Water

The EPM will be responsible for oversight of the Spill Response Contractor and the operation of their Herbicide Spill Response System. The Spill Response Contractor will be responsible for providing and deploying the spill response equipment, removing the spill, containing the extracted water, and transporting and disposing the water. The EPM will be responsible for inspecting the Herbicide Spill Response System prior to CMT activities and providing oversight during CMT activities to observe for potential leaks. The Spill Response Contractor will be responsible for proper waste disposal and providing the waste manifests/disposal documentation to the EPM. Spill response for spills in the water are described in Sections 7.4 and 7.5 of this Plan.

6. SPILL PREVENTION AND BEST MANAGEMENT PRACTICES

The following spill prevention measures and BMPs evaluated below should be implemented to avoid a spill during CMT activities.

6.1. CMT Chemicals Used

The following chemicals will be used during the CMT. Only the chemicals containing active herbicides, require implementation of spill response measures should a release to land or water occur.

- Endothall (Aquathol K® or Cascade®) – Liquid products containing identical active ingredient herbicide
- Triclopyr (Renovate-3®) – Liquid product containing active herbicide



- Triclopyr (Renovate-OTF®) – Granular product containing active herbicide
- Rhodamine Water Tracer Aquatic Dye (RWT) – Dye with Rhodamine as 20% of the active ingredients
- Phoslock – Contingent Action (elevated phosphorus levels):
 - o Aqueous blend of phosphate binding materials

Liquid chemicals will be applied through weighted hoses to the bottom of the test sites. The liquid chemical will be poured from the manufacturer's container into the liquid applicator mixing tank situated on the application vessel where they are diluted to the appropriate concentrations as specified in the APAP. An alternative application method may be used in which the herbicide chemical is pumped from the manufacturer's container into the in-line injection system and mixed with water as it is injected into the test sites. Granular herbicide chemicals will be placed into the hopper of the spreader applicator situated on the application vessel.

6.2. CMT Preparation

Contractor Qualifications

The Applicator will meet the following required qualifications:

- Applicator and Applicator staff must be certified applicators and must provide their California Aquatic Pesticide Certification (QAL) license number and current validation.
- Record of continuing education units (CEUs) for the past 5 years.
- Examples and references for recent (last 3 years) and historic (past 10 years) experience implementing aquatic herbicide chemical applications.
- Possession of California Boater Card or equivalent (if Contractor plans to provide vessel / operate vessel).
- Experience applying products specified for this scope.

The Applicator will provide the following information:

- Description and age of applicator vessel, including hull construction, length, beam, power, use, and safety equipment.
- Descriptions and conditions of on-board GPS and depth-recording instrumentation used on application vessel(s).
- Methods/protocols used to calibrate herbicide application equipment to ensure that the final concentrations are correct.

The Applicator and supervised staff will comply with all applicable directions, limitations, conditions, application methods and equipment, PPE and all other safety and environmental protection, disposal and containment requirements stated in the respective label for all chemicals specified (see Appendix B for Safety Data Sheets). The Applicator will review the label, application schedule and application logistics to ensure compliance with all labelling. The Applicator will take



great care in handling the chemicals as to not create a spill on to land, within the water, or within the application vessel.

6.3. Application Vessel Preparation

The test sites where chemicals are applied will be separated from the main part of the lagoon using several strategically located double barrier turbidity curtains, which will be installed before CMT activities begin (see Figure 1 for locations of double barrier turbidity curtains).

Chemicals to be used during CMT activities will be brought to the Staging Area (See Figure 2 for location of the Staging Area). Chemicals will either be transferred directly from the delivery vehicle to the Applicator's vehicle or placed in secondary containment. The Applicator may carry enough chemical in their vehicle to treat three replicate test sites at a time. The Applicator will convey all chemicals in secondary containment in the manufacturer's sealed containers to the boat ramp location closest to the test site where chemicals will be applied (see Figure 2). Loading of chemicals onto the application vessel must be done behind the double turbidity curtains. Chemicals will be loaded from the boat ramp and into secondary containment on the application vessel. All secondary containment structures will be sized to hold the contents of the largest single chemical container. The largest containers of herbicide are 2.5 gallons of liquid herbicide chemical or 40 pounds of granular herbicide chemical. Only the chemical quantity for up to three test sites to achieve targeted final concentration will be loaded on the application vessel.

The entire application system (including pumps, valves, and hoses) will be tested for integrity by the Applicator under operating pressures before any chemical is loaded for application. All equipment will be calibrated by the Applicator using standard, accepted methods to ensure that the correct amount of herbicide is properly applied to each test site. Calibration medium used will be clean water for liquid applicators and blank, inert pellets for granular applicators.

If necessary, proper off-site washdown of the application vessel will be completed following treatment applications, and if necessary, the Applicator will ensure any chemical contaminated water in the vessel is properly removed, stored, and disposed of in accordance with the product labeling and Local, State, and Federal requirements.

6.4. Chemical Herbicide Application

The application vessel will be driven to the test site where the liquid chemical will either be poured or pumped into the mixing tank with water or pumped directly into the in-line injection system and applied through a weighted hose. Granular chemicals will be loaded into a spreader hopper which applies the chemical to the surface water within the test site and allowed to sink to the lagoon floor.

Herbicide chemicals will be applied to the test sites in quantities necessary to achieve the target concentrations outlined in the APAP. Fluorescent dye, RWT, will be injected with the liquid herbicides in the mixing tank, or applied separately immediately after application of granular herbicide to monitor the movement of the herbicide chemicals in the water.



In the event of elevated phosphorus within the test sites after application of chemical herbicides, Phoslock will be used to reduce phosphorus levels. Phosphate concentrations within the test sites will be determined by laboratory testing post CMT herbicide chemical application. Phoslock may be applied to the test site as a liquid slurry through a weighted hose or as a granular material through a spreader to the water's surface and allowed to sink to the lagoon floor. Spill prevention and response is not required for the use of Phoslock.

6.5. Test Site Contamination Prevention

Upon completion of application for a given herbicide, the pumping/hoses system will be flushed within the test site using clean water and will be removed from the water prior to movement out of a treated area.

7. SPILL RESPONSE

The following procedures will be followed in the event of an unplanned release of chemical herbicide to land, water, or within the application vessel. Following the cleanup of a spill, a Spill Report Form (Appendix A) will be completed.

7.1. Definition of a Spill

For the purposes of this Plan, any unplanned release of chemicals containing herbicide constitutes a spill. Spill response procedures will vary depending on the type and location of the spill.

7.2. Spill on Land

Spill Scenarios

A spill on land would most likely occur during the transfer of chemicals from the delivery vehicle to the Applicator's vehicle at the staging area, or from the Applicator's vehicle to the application vessel.

Spill Response BMPs Materials

The following BMP materials should be immediately available during chemical handling on land.

- Secondary containment for storage of chemicals at the staging area and in the Applicator's vehicle with enough capacity to hold the contents of the largest container of chemical.
- Booms, waddles, or any suitable barrier device to control the spread of a liquid or granular chemical spill.
- Absorbents sufficient to hold the contents of the largest liquid chemical container. Examples of acceptable absorbents are pads, mats, or clay/silica gel litters (e.g. kitty litter) specifically designed for spill response.
- Shovel.
- Broom or other equipment suitable for picking up granular materials.



- Watertight container/drum large enough to contain impacted soils.
- Watertight container/drum large enough to contain impacted BMPs and PPE materials.

Spill Response Procedures

Should a spill occur on land, at a minimum, the following actions should be taken.

- Spill on a paved or concrete surface:
 - o Deploy booms, waddles, or another suitable barrier device to prevent the spill from spreading.
 - o If the spill is a liquid chemical, use absorbents (pads, mats, or litter) to absorb the spill from the surface.
 - o If the spill is a granular chemical, use broom or other suitable equipment to sweep all granular material from surface.
 - o Use shovel or broom to clean up spent absorbent.
 - o Use watertight containers to hold used BMP and PPE materials until they can be properly disposed in accordance with Local, State, and Federal regulations.
- Spill on soil or vegetated surface:
 - o Deploy booms, waddles, or another suitable barrier device to prevent the spill from spreading.
 - o Use absorbent materials (pads, mats, or litter) for any standing liquid.
 - o For a granular spill, remove granular material, and remove soil from impacted area to at least a depth of 2 inches. For a liquid spill, following removal of standing liquid, remove soil from impacted area to at least a depth of 4 inches.
 - o Immediately place impacted soil and vegetation, BMPs, and PPE materials in a watertight container and dispose of in accordance with and Local, State, and Federal Requirements.
- Notify Facility Contacts listed in section 3. **EMERGENCY NOTIFICATION AND AGENCY CONTACTS Facility Contacts** of this Plan of the spill.
- In accordance with the TKPOA CMT National Pollutant Discharge Elimination System (NPDES) Permit (NPDES Permit) Attachment E Section V.G. provide:
 - o Within 24 hours, provide the Lahontan Water Board with a Twenty-Four-Hour Report as described in NPDES Permit Attachment E Section V.G.1.



- o Within five days, provide the Lahontan Water Board with a Five-Day Written Report as described in NPDES Permit Attachment E Section V.G.2.
- o Immediately contact the Governor's Office of Emergency Services (OES), as described in NPDES Permit Attachment E Section V.G.3.
 - The Governor's OES must notify the following immediately:
 - Lahontan Water Board
 - Local health officer
 - Administrator of environmental health
- o Within 24 hours, notify the Lahontan Water Board's Lake Tahoe office by telephone of any spills reported to the Governor's OES as described in NPDES Permit Attachment E Section V.G.3.
- Notify other applicable agencies listed in section **3. EMERGENCY NOTIFICATION AND AGENCY CONTACTS** of this Plan of the spill as required.

7.3. Spill Within Application Vessel

Spill Scenarios

A spill within the application vessel would most likely occur during the transfer of chemical from the Applicator's vehicle to the application vessel, or from the manufacturer's container to application system.

Spill Response BMP Materials

The following BMP materials should be immediately available during chemical handling within the application vessel.

- Booms, waddles, or any suitable barrier device to control the spread of a liquid or granular chemical spill.
- Absorbents sufficient to hold the contents of the largest liquid herbicide chemical container. Examples of acceptable absorbents are pads, mats, or clay/silica gel litters (e.g. kitty litter) specifically designed for spill response.
- Watertight container for impacted BMP and PPE materials.
- Broom or other equipment suitable for cleaning up impacted absorbents or granular herbicide chemicals.



Spill Response Procedures

Should a spill occur within the application vessel, at a minimum, the following actions should be taken.

- Immediately stop chemical application and stop vessel if in motion.
- Deploy booms, waddles, or another suitable barrier device around the spill.
- If the spill is a liquid chemical, use absorbents (pads, mats, or litter) or to remove the spill from the floor of the application vessel.
- If the spill is a granular chemical, use broom or other suitable equipment to sweep all granular material from the floor of the application vessel.
- Take special care to rinse shoes or any other personal items that may have come in contact with the chemical that will also come in contact with the land or water after exiting the application vessel.
- Place impacted BMPs, PPE materials and swept up granular herbicide chemicals into a watertight container and dispose of in accordance with Local, State, and Federal Requirements.

7.4. Spill to Water Within a Test Site

Spill Scenarios

A spill to the water within a test site would most likely occur from a spill from the manufacturer's container during transfer of chemicals to the application equipment, a malfunction in the application equipment during treatment, or if the incorrect concentration of chemical is applied due to operator error or incorrect calibration of application equipment. Spill response procedures differ slightly for herbicide chemical as outlined below.

Spill Response BMP Materials

The following BMP materials should be immediately available during chemical application within a test site.

Herbicide Chemical Spill Response BMP Materials:

- Herbicide Spill Response System (see Appendix C)
- GPS unit to record coordinates of spill site.
- RWT.

Spill Response Procedures

Should a spill occur to the water within a test site, at a minimum, the following actions should be taken.



- Immediately stop any chemical application and stop application vessel if in motion, and record GPS coordinates to identify location of spill.
- Apply RWT (less than 50 mL) to the spill area as an aid for visual identification of the spill (this BMP would apply only if RWT is not already being applied with an herbicide application at a test site as required under the NPDES for the CMT).
- Herbicide Chemical Spills Only:
 - o If an herbicide chemical spill is estimated to result in a concentration that is likely to exceed the maximum label allowable concentrations (i.e. 5 ppm for endosulfan, 2.5 ppm for triclopyr) within the test site, the Spill Response Contractor listed in **Section 3. EMERGENCY NOTIFICATION AND AGENCY CONTACTS** of this Plan will be immediately deployed to the spill area.
 - Stratus Engineering Associates will deploy the Herbicide Spill Response System to the spill area and pump affected water (identified by the GPS coordinates and RWT) at a maximum rate of 300 gallons per minute until the dye is no longer visible or a minimum of 1,600-gallons of water has been removed.
 - o If an herbicide chemical spill is suspected to have caused a concentration of less than the maximum label allowable concentrations (i.e. 5 ppm for endosulfan, 2.5 ppm for triclopyr) within the testing site, no action will be taken.
- Notify the CMT Project Team Contacts listed in **Section 3. EMERGENCY NOTIFICATION AND AGENCY CONTACTS** of this Plan about the spill.
- In accordance with the TKPOA CMT NPDES Permit Attachment E Section V.G. provide:
 - o Within 24 hours, provide the Lahontan Water Board with a Twenty-Four-Hour Report as described in NPDES Permit Attachment E Section V.G.1.
 - o Within five days, provide the Lahontan Water board with a Five-Day Written Report as described in NPDES Permit Attachment E Section V.G.2.
 - o Immediately contact the Governor's Office of Emergency Services (OES), as described in NPDES Permit Attachment E Section V.G.3.
 - The Governor's OES must notify the following immediately:
 - Lahontan Water Board
 - Local health officer
 - Administrator of environmental health



- o Within 24 hours, notify the Lahontan Water Board's Lake Tahoe office by telephone of any spills reported to the Governor's OES as described in NPDES Permit Attachment E Section V.G.3.
- Notify other applicable agencies listed in **Section 3. EMERGENCY AND AGENCY CONTACTS** of this Plan about the spill.
- Water extracted during a spill response will be disposed of outside the Tahoe Basin area by the spill response contractor in accordance with Local, State, and Federal regulations (see details in Appendix C).

7.5. Spill to Water Outside the Test Sites

Spill Scenarios

A spill to the water outside of the test sites would most likely occur from a malfunction in the application vessel or operator error that would cause the manufacturer's container, or the contents of the container, to spill into the water. Spill response procedures differ slightly for herbicide chemical as outlined below.

Spill Response BMP Materials

The following BMP materials should be immediately available during chemical application within a test site.

Herbicide Chemical Spill Response BMP Materials:

- Herbicide Spill Response System (see Appendix C)
- GPS unit to record coordinates of spill site.
- RWT.

Spill Response Procedures

Should a spill occur to the water outside of a testing site, at a minimum, the following actions should be taken.

- Immediately stop chemical application and stop application vessel if in motion, and record GPS coordinates to identify location of spill.
- Apply RWT to the spill area as an aid for visual identification of the spill (this BMP would apply only if RWT is not already being applied with an herbicide application at a CMT test site as required under the NPDES for the CMT).
- Herbicide Spills Only:
 - o Call the spill response contractor **Section 3. EMERGENCY AND AGENCY CONTACTS** of this Plan immediately to the spill site.



- o The spill response contractor will deploy the Herbicide Spill Response System to the spill area and pump affected water (identified by the RWT) at a maximum rate of 300 gallons per minute until the dye is no longer visible or approximately 2,000 gallons has been removed.
- Notify the Facility Contacts listed in **Section 3. EMERGENCY AND AGENCY CONTACTS Facility Contacts** of this Plan about the spill.
- In accordance with the TKPOA CMT NPDES Permit Attachment E Section V.G. provide:
 - o Within 24 hours, provide the Lahontan Water Board with a Twenty-Four-Hour Report as described in NPDES Permit Attachment E Section V.G.1.
 - o Within five days, provide the Lahontan Water board with a Five-Day Written Report as described in NPDES Permit Attachment E Section V.G.2.
 - o Immediately contact the Governor's Office of Emergency Services (OES), as described in NPDES Permit Attachment E Section V.G.3.
 - The Governor's OES must notify the following immediately:
 - Lahontan Water Board
 - Local health officer
 - Administrator of environmental health
 - o Within 24 hours, notify the Lahontan Water Board's Lake Tahoe office by telephone of any spills reported to the Governor's OES as described in NPDES Permit Attachment E Section V.G.3.
- Notify other applicable agencies listed in **Section 3. EMERGENCY AND AGENCY CONTACTS** of this Plan about the spill.
- Water extracted during a herbicide chemical spill response will be disposed of outside the Tahoe Basin area by the spill response contractor in accordance with Local, State, and Federal regulations (see Appendix C for additional details).

7.6. Spill Response Contractor

The Spill Response Contractor will be responsible for pumping water from the Tahoe Keys Lagoons in response to an herbicide chemical spill that occurs outside the test sites or within a test site that is suspected to result in a concentration more than the maximum label allowable concentrations (i.e. 5 ppm for endosulfan, 2.5 ppm for triclopyr). At a minimum, the Spill Response Contractor will have the capabilities to perform the following activities:



- Respond to a spill anywhere in the Tahoe Keys Lagoons within a maximum 20 minutes of notification that a spill occurred.
- Equipment capable of responding to a spill within the Tahoe Keys Lagoons from the residential streets in the Tahoe Keys neighborhood.
- Pumping capacity of 300 gallons per minute.
- Holding tank capacity of a minimum 1,600 gallons.
- Final transportation and disposal of pumped water.



8. CONDITIONS AND LIMITATIONS

This Plan has been prepared for the exclusive use of the TKPOA. Stratus Engineering Associates (Stratus) has performed the work described herein within the limits prescribed by our proposal and using the usual degree of care and thoroughness normally employed by the environmental consulting profession at the time and locality in which the study was completed. The scope of services performed in execution of this Plan may not be appropriate to satisfy the needs of other users, and any use of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said third party.

Prepared By:



Robert Kull, P.E.
Principal Engineer



Kari Campos
Project Engineer



FIGURES



Figure 1. Control Methods Test Final Treatment Sites



Figure 2. Boat Storage, Launching, and Mooring



APPENDIX A DAILY FIELD REPORT / SPILL REPORT FORM



Pre-Field Checklist – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Environmental Program Manager (EPM) <i>Responsible for observing and documenting chemical application and spill prevention/response activities.</i>			
General:	☐ Health and Safety Plan Available ☐ Spill Prevention and Response Plan (SPRP) Available ☐ Tail Gate Safety Meeting Forms ☐ Field Forms ☐ Public Questions Contact Card		Notes:
Staging Area Address: Time: Names of Those Present: 	Chemicals Present: ☐ Endothall ☐ Aquathol K [®] ☐ Cascade [®] ☐ Triclopyr ☐ Renovate-3 [®] ☐ Reovate-OTF [®] ☐ EutroSORB [®] WC ☐ RWT ☐ Other:	BMPs: ☐ Appropriately Sized Secondary Containment at Staging Area ☐ Appropriately Sized Secondary Containment in Transportation Vehicle ☐ Chemicals Sealed in Manufacturer's Containers ☐ Quantity of Chemical Loaded in Transportation Vehicle Does Not Exceed Amount for Three CMT Sites ☐ Appropriate Quantity of Boom/Waddles/Other Barrier Devices ☐ Appropriate Quantity of Absorbents/Pads/Mats ☐ Shovel ☐ Broom/Vacuum for Granular Material Spill ☐ Appropriately Sized Watertight Drum for Impacted BMPs/PPE, soil, and Spilled Chemical	Notes/Specific BMPs Available for Use:
Application Vessel Boat Launch Location Address: Time: Names of Those Present: 	Chemicals Present: ☐ Endothall ☐ Aquathol K [®] ☐ Cascade [®] ☐ Triclopyr ☐ Renovate-3 [®] ☐ Reovate-OTF [®] ☐ EutroSORB [®] WC ☐ RWT ☐ Other:	BMPs: ☐ Appropriately Sized Secondary Containment in Application Vessel ☐ Application Equipment Integrity Tested and Calibrated by Applicator ☐ Chemicals Sealed in Manufacturer's Containers ☐ Quantity of Chemical Loaded in Application Vessel Does Not Exceed Amount for Three CMT Sites ☐ Appropriate Quantity of Boom/Waddles/Other Barrier Devices ☐ Appropriate Quantity of Absorbents/Pads/Mats ☐ Shovel ☐ Broom/Vacuum for Granular Material Spill ☐ Appropriately Sized Watertight Drum for Impacted BMPs/PPE and Spilled Chemical	Notes/Specific BMPs Available for Use:



Pre-Field Checklist – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Spill Response Contractor Starting Address: Time: _____ Names of Those Present: 	Equipment: ☐ Equipment Comparable to Figure C-1 in SPRP ☐ Water Tank (Minimum 1,600 Gallon Capacity) ☐ Floating Hoses ☐ Hose Capable of Reaching 15' Depth ☐ Manifest Forms ☐ Other:	Notes:																							
Photo Log	Photos Required: ☐ Yes ☐ No	<table border="1"> <thead> <tr> <th>Photo #</th> <th>Photo Descriptions:</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	Photo #	Photo Descriptions:																					
Photo #	Photo Descriptions:																								



Pre-Field Checklist – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

NOTES:

Name: _____

Signature: _____ Date: _____



Environmental Program Manager (EPM)

Responsible for observing and documenting chemical application and spill prevention/response activities.

General Information			
Facility Name	TKPOA		
Date		Start/End Time	
Name(s)			
Title(s)			
Contact Information			
Project Site Information			
Weather at time of this inspection/observation? ☐ Clear ☐ Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snow ☐ High Winds ☐ Other: _____ Temperature: _____ F			

Project Forms and Documentation			
	Activity	Completed	Corrective Action Needed and/or Notes
1	Safety and Operations Tailgate Meeting Conducted	☐ Yes ☐ No	
2	Pre-Field Checklist Completed	☐ Yes ☐ No	
3	Spill Occurred	☐ Yes ☐ No ☐ N/A	
4	Spill Report Completed	☐ Yes ☐ No ☐ N/A	

Project Observations	
Description of Planned Activities:	



Daily Field Report - Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Spill Prevention and Response Plan

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Project Observations Continued

Problems/Variations from Planed Activities ☐ Yes ☐ No

Summarize if Yes

Observed inured, trapped, or dead wildlife ☐ Yes ☐ No

Summarize if Yes

Encounter any uncooperative members of the public ☐ Yes ☐ No

Summarize if Yes

Observation of paint/start of cyanobacteria growth ☐ Yes ☐ No

Summarize if Yes

Recommendations or other notes for future Spill Prevention and Response activities ☐ Yes ☐ No

Summarize if Yes



Daily Field Report - Spill Prevention and Response

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Photo Log NOTES:	Photo #	Photo Descriptions:



Daily Field Report - Spill Prevention and Response

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NOTES:

Name: _____

Signature: _____ Date: _____



Spill Report Form – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

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Environmental Program Manager (EPM)

Responsible for observing and documenting chemical application and spill prevention/response activities.

General Information			
Facility Name:	TKPOA		
Date:		Start/End Time	
Name(s):			
Title(s):			
Contact Information:			
Notifications:			
Facility Contact Name:	Notes of Discussion:		
Time of contact:			
Facility Contact Name:	Notes of Discussion:		
Time of contact:			
Agencies and Agency Personnel Contacted:	Notes of Discussion:		
Time of contact:			
Agencies and Agency Personnel Contacted:	Notes of Discussion:		
Time of contact:			

Spill Report Form – Spill Prevention and Response

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Weather Information

Weather at time of the spill:

☐ Clear ☐ Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snow ☐ High Winds
☐ Other: Temperature: _____F

General Spill Information

Location of Spill:

☐ Land on Paved Surface ☐ Land on Vegetated Surface ☐ Application Vessel ☐ Water Within Test Site
☐ Water Outside Test Site

Location of Spilled Herbicide Chemical:

Test Sites Affected (if applicable):

Chemicals Spilled:

Name of chemical:

Approximate amount of spilled chemical:

Events that led to the spill:

Spill Report Form – Spill Prevention and Response

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Spill Response Activities and Best Management Practices (BMPs) Used

	Spill Response Activity	BMPs Used	Controls Adequate (appropriate, effective, and operating)?	Notes:
Spill Occurring on Land:				
1	Spill Containment	☐ Waddles ☐ Booms ☐ Other:	☐ Yes ☐ No	Notes:
2	Spill Removal	☐ Absorbent Pads ☐ Clay/Silica Litter ☐ Broom/Sweep ☐ Other:	☐ Yes ☐ No	Notes:
3	Affected Soils or Vegetation	☐ Depth of soil/vegetation removed: _____ ☐ N/A	☐ Yes ☐ No	Notes:
4	Type of Disposal Container	☐ Drum ☐ Other:	☐ Yes ☐ No	Notes:
5	Other Spill Response	Other BMPs	☐ Yes ☐ No	Notes:
Spill Occurring on Application Vessel				
1	Spill Containment	☐ Waddles ☐ Booms ☐ Other:	☐ Yes ☐ No	Notes:
2	Spill Removal	☐ Absorbent Pads ☐ Clay/Silica Litter ☐ Broom/Sweep ☐ Other:	☐ Yes ☐ No	Notes:
3	Type of Disposal Container	☐ Drum ☐ Other:	☐ Yes ☐ No	Notes:
4	Other Spill Response	Other BMPs	☐ Yes ☐ No	Notes:

Spill Report Form – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

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	Spill Response Activity	BMPs Used	Controls Adequate (appropriate, effective, and operating)?	Notes:
Spill Occurring on Water				
1	Rhodamine WT Applied	☐ Yes ☐ No ☐ Amount:	☐ Yes ☐ No	Notes:
2	Herbicide Spill Response System Deployed	☐ Yes ☐ No ☐ Amount of affected water removed:	☐ Yes ☐ No	Notes:
3	Other Spill Response	☐ Depth of soil/vegetation removed: _____ ☐ N/A	☐ Yes ☐ No	Notes:

Photo Log NOTES:	Photo #	Photo Descriptions:

Spill Report Form – Spill Prevention and Response

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Photo Log NOTES:	Photo #	Photo Descriptions:

Spill Report Form – Spill Prevention and Response

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

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NOTES:

Name: _____

Signature: _____ **Date:** _____

APPENDIX B SAFTEY DATA SHEETS



SAFETY DATA SHEET



PHOSLOCK[®]

Granules / Powder

SECTION 1. IDENTIFICATION

GHS product identifier : Phoslock Granules / Powder

Other means of identification : Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses : Used to remove prescribed oxyanions in a variety of natural environments such as lakes, rivers, estuaries, dams, ornamental ponds and natural wetlands. Also in artificial environments including waste effluents such as sewage and industrial effluents and as a barrier within containment cells for leachable wastes.

Supplier's details : SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032
Tel: 317-580-8282, Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm EST
www.sepro.com

Emergency telephone number : INFOTRAC - 24-hour service 1-800-535-5053

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product.

For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

CHEMWATCH HAZARD RATINGS

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

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



SDS

PHOSLOCK®



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

GHS Classification: Not Applicable

Label Elements

GHS Label Elements: Not Applicable

Signal Word: Not Applicable

Hazard statement(s): Not Applicable

Precautionary Statement(s)

Prevention

If medical advice is needed, have product container or label at hand.
Keep out of reach of children.
Read label before use.

Response: Not Applicable

Storage: Not Applicable

Disposal: Not Applicable

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances See section below of composition of Mixtures

CAS No.	% [weight]	Name
Not Available	100	Ingredients determined not to be hazardous

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4. FIRST AID MEASURES

Eye Contact

If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- See medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

Inhalation

- If fumes, aerosols or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

Ingestion

- If swallowed do **NOT** induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

Most important symptoms and effects, both acute and delayed: See Section 11

Indication of any immediate medical attention and special treatment needed: Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

There is no restriction on the type of extinguisher which may be used. Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility: Not known.

Special protective equipment and precautions for fire-fighters**Fire Fighting:**

Alert Fire Brigade and tell them location and nature of hazard. Wear breathing apparatus plus protective gloves in the event of a fire. Prevent, by any means available, spillage from entering drains or water courses. Use firefighting procedures suitable for surrounding area. DO NOT approach containers suspected to be hot. Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire. Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard:

Non combustible. Not considered a significant fire risk, however containers may burn. May emit poisonous fumes. May emit corrosive fumes.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures**Minor Spills:**

Remove all ignition sources. Clean up all spills immediately. Avoid contact with skin and eyes. Control personal contact with substance, by using protective equipment. Use dry clean up procedures and avoid generating dust. Place in a suitable, labelled container for waste disposal.

Major Spills:

Moderate Hazard.

CAUTION: Advise personnel in area. Alert Emergency Services and tell them location and nature of hazard. Control personal contact by wearing protective clothing. Prevent, by any means available, spillage from entering drains or water courses. Recover product wherever possible.

IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal.

IF WET: Vacuum/shovel up and place in labelled containers for disposal.



ALWAYS: Wash area down with large amounts of water and prevent runoff into drains. If contamination of drains or waterways occurs, advise Emergency Service.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling: Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. **DO NOT** enter confined spaces until atmosphere has been checked. **DO NOT** allow material to contact humans, exposed food or food utensils. Avoid contact with incompatible materials. When handling, **DO NOT** eat, drink or smoke. Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Launder contaminated clothing before re-use. Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Other Information: Store in original containers. Keep containers securely sealed. Store in a cool, dry area protected from environmental extremes. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.

For major quantities: Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams). Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

Conditions for safe storage, including any incompatibilities

Suitable container: Polyethylene or polypropylene container. Check all containers are clearly labelled and free from leaks.

Storage Incompatibility: Avoid reaction with oxidizing agents. Protect from light.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Occupational Exposure Limits (OEL)

Ingredient Data: Not Available

Emergency Limits				
Ingredient	Material Name	TEEL-1	TEEL-2	TEEL-3
Phoslock Granules / Powder	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
Ingredients determined not to be hazardous	Not Available	Not Available

Exposure Controls

PHOSLOCK®

Phosphorus Locking Technology

Appropriate engineering controls:

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.

Employers may need to use multiple types of controls to prevent employee overexposure.

Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction. If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered.

Such protection might consist of:

- (a) particle dust respirators, if necessary, combined with an absorption cartridge;
- (b) filter respirators with absorption cartridge or canister of the right type;
- (c) fresh-air hoods or masks.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:

Direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone or rapid air motion).
Grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

Air Speed:

1-2.5 m/s (200-500 f/min.)
2.5-10 m/s (500-2000 f/min)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favorable to capture.
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion.

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Personal protection:

**Eye and face protection:**

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

Skin protection:

See Hand protection below.

Hands/feet protection:

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: frequency and duration of contact, chemical resistance of glove material, glove thickness and dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.

When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.

Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.

Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present: polychloroprene; nitrile rubber; butyl rubber; fluorocautchouc; polyvinyl chloride.

Gloves should be examined for wear and/ or degradation constantly.

Body protection: See other protection below.

Other protection:

Overalls.
P.V.C. apron.
Barrier cream.
Skin cleansing cream.
Eye wash unit.

Thermal hazards: Not available.

Respiratory protection Particulate. (AS/NZS 1716 & 1715, EN 143:000 & 149:001, ANSI Z88 or national equivalent)

Quartz CAS 14808-60-7	0.025 mg/m ³ TWA (respirable fraction)	Not established
Titanium dioxide CAS 13463-67-7	10 mg/m ³ TWA	15 mg/m ³ TWA (total dust)

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene
OSHA = Occupational Safety and Health Administration
TWA = Time Weighted Averages are based on 8h/day, 40h/week exposures

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Light brown granules; insoluble in water
Physical state	Divided solid
Odor	Not available
Odor threshold	Not available
pH (as supplied)	Not applicable
Melting point / freezing point (°C)	>1000
Initial boiling point and boiling range (°C)	Not applicable
Flash point (°C)	Not applicable
Evaporation rate	Not applicable
Flammability	Not applicable
Relative density (Water = 1)	1.1
Partition coefficient n-octanol / water	Not available
Auto-ignition temperature (°C)	Not applicable
Decomposition temperature	Not available
Viscosity (cSt)	Not available
Molecular weight (g/mol)	Not applicable
Taste	Not available
Explosive properties	Not available
Oxidising properties	Not available
Upper Explosive Limit (%)	Not applicable
Lower Explosive Limit (%)	Not applicable
Vapour pressure (kPa)	Not applicable
Solubility in water (g/l)	Immiscible
Vapour density (Air = 1)	Not available
Surface Tension (dyn/cm or mN/m)	Not applicable



Volatile Component (% vol)	Not applicable
Gas group	Not available
pH as a solution (1%)	7 – 7.5 (2%)
VOC g/L	Not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	See section 7 • Unstable in the presence of incompatible materials.
Chemical stability	• Product is considered stable. • Hazardous polymerization will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects:

Inhaled	• Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. • If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
Ingestion	• Accidental ingestion of the material may be damaging to the health of the individual. • Ingestion may result in nausea, abdominal irritation, pain and vomiting.
Skin Contact	• The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. • Open cuts, abraded or irritated skin should not be exposed to this material. • Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	• Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). • Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.
Chronic	• Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. • Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

Phoslock Granules / Powder

Toxicity	Irritation
Dermal (Rabbit) LD50: None PDII/4hr ^[2]	Not available
Inhalation (Rat) LC50: >5000 mg/L/4h ^[2]	

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

Acute Toxicity	Data available but does not fill the criteria for classification
Skin Irritation/Corrosion	Data not available to make classification
Serious Eye Damage/Irritation	Data not available to make classification
Respiratory or Skin Sensitization	Data not available to make classification
Mutagenicity	Data not available to make classification
Carcinogenicity	Data not available to make classification
Reproductivity	Data not available to make classification
STOT – Single Exposure	Data not available to make classification
STOT – Repeated Exposure	Data not available to make classification
Aspiration Hazard	Data not available to make classification

SECTION 12. ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Legend</i>	<i>Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances – Ecotoxicological Information – Aquatic Toxicity 3. EPIWIN Suite V3.12 – Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database – Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) – Bioconcentration Data 7. METI (Japan) – Bioconcentration Data 8. Vendor Data</i>				

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No data available for all ingredients	No data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No data available for all ingredients

SECTION 13. DISPOSAL CONSIDERATIONS

Product / Packaging Disposal Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.

- **DO NOT** allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorized landfill.
- Recycle containers if possible, or dispose of in an authorized landfill.

SECTION 14. TRANSPORT INFORMATION

Labels Required

Marine Pollutant: No

Land transport (DOT): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

**Air transport
(ICAO-IATA / DGR):** NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

**Sea transport
(IMDG-Code / GGVSee):** NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SECTION 311/312 HAZARD CATEGORIES

PHOSLOCK®

Phosphorus Locking Technology



Immediate (acute) health hazard NO
Delayed (chronic) health hazard NO
Fire Hazard NO
Pressure Hazard NO
Reactivity hazard NO

US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4): None Reported

State Regulations

US California Proposition 65

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	Y
China - IECSC	Y
Europe-EINEC/ELINCS/NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand – NZIoC	Y
Philippines - PICCS	Y
USA – TSCA	Y

Legend: Y = All ingredients are on the inventory

N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16. OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC – TWA: Permissible Concentration-Time Weighted Average
PC – STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit.
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odor Safety Factor



NOAEL: No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odor Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

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TEL (+61 3) 9572 4700.

Prepared by:	SePRO Corporation
Written Date	03/12/2015
Date:	03/01/2022
Reason for Editing:	Updated information and formatting for each section.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Phoslock is a registered trademark of Phoslock Technologies Pty Ltd.
Always read and follow safety directions.



Conforms to HazCom 2012/United States

SDS

Renovate® 3

SAFETY DATA SHEET



Renovate® 3

Herbicide

Section 1. Identification

GHS product identifier : Renovate® 3 Herbicide

Recommended use of the chemical and restrictions on use
Identified uses : Herbicide

Supplier's details : SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm [E.S.T.](http://www.sepro.com)
www.sepro.com

Emergency telephone number (with hours of operation) : INFOTRAC - 24-hour service 1-800-535-5053

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

Hazard classification : GHS classification in accordance with 29CFR 1910.1200.
Flammable liquids - Category 3
Eye irritation - Category 2A
Specific target organ toxicity - repeated exposure - Category 2

Label elements
Hazard pictograms



Signal word: WARNING!



Hazards	Flammable liquid and vapor. Causes serious eye irritation. May cause damage to organs (kidney) through prolonged or repeated exposure.
Precautionary statements	
Prevention	Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ ventilating/ lighting/ equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. Wash skin thoroughly after handling. Wear protective gloves/ eye protection/ face protection.
Response	
IF ON SKIN (or hair):	Take off immediately all contaminated clothing. Rinse skin with water/ shower.
IF IN EYES:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if you feel unwell. If eye irritation persists: Get medical advice/ attention.
In case of fire:	Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Storage	Store in a well-ventilated place. Keep cool.
Disposal	Dispose of contents/ container to an approved waste disposal plant.
Other hazards	No data available

Section 3. Composition/information on ingredients

This product is a mixture.

Component	CASRN	Concentration
Triclopyr Triethylamine Salt	57213-69-1	44.05%
Ethanol	64-17-5	2.10%
Balance	Not Available	53.85%

Section 4. First aid measures

Description of first aid measures

General advice:	First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Inhalation:	Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc.). Call a poison control center or doctor for treatment advice.
Skin contact:	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.



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Eye contact:	Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice. Suitable emergency eye wash facility should be immediately available.
Ingestion:	Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed:	Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.
Indication of any immediate medical attention and special treatment needed	
Notes to physician:	No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

Section 5. Fire-fighting measures

Suitable extinguishing media:	To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Straight or direct water streams may not be effective to extinguish fire. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.
Unsuitable extinguishing media:	No data available
Special hazards arising from the substance or mixture	
Hazardous combustion products:	Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen chloride. Carbon monoxide. Carbon dioxide.
Unusual Fire and Explosion Hazards:	This material will not burn until the water has evaporated. Residue can burn. May produce flash fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. If exposed to fire from another source and water is evaporated, exposure to high temperatures may cause toxic fumes.
Advice for firefighters	
Fire Fighting Procedures:	Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Eliminate ignition sources. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause



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environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this SDS.

Special protective equipment for firefighters:

Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Evacuate area. Keep unnecessary and unprotected personnel from entering the area. Keep personnel out of low areas. Only Trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. Refer to section 7, Handling, for additional precautionary measures. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for

containment and cleaning up: Contain spilled material if possible. Pump with explosion-proof equipment. If available, use foam to smother or suppress. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact SePRO Corporation for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

Section 7. Handling and storage

Precautions for safe handling: Keep away from heat, sparks and flame. Keep out of reach of children. Do not swallow. No smoking, open flames or sources of ignition in handling and storage area. Do not get in eyes. Avoid contact with skin and clothing. Avoid breathing vapor or mist. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Electrically ground and bond all equipment. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flashback may occur. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies. Minimize sources of ignition, such as static build-up, heat, spark or flame.

Section 8. Exposure controls/personal protection

Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value/Notation
Triclopyr Triethylamine Salt	Dow IHG	TWA	2 mg/m ³
	Dow IHG	TWA	SKIN, DSEN, BEI
Ethanol	ACGIH	STEL	1,000 ppm
	OSHA Z-1	TWA	1,900 mg/m ³ 1,000 ppm

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

Exposure controls

Engineering controls:

Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use chemical goggles.

Skin protection

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Wear clean, body-covering clothing.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Section 9. Physical and chemical properties

Appearance	
Physical State	Liquid
Color	Pink
Odor	Ammoniacal
Odor Threshold	No test data available
pH	9.5 10% <i>pH Electrode</i>
Melting point/range	Not applicable
Freezing point	No test data available
Boiling point (760 mmHg)	No test data available
Flash point	Closed cup 43 °C (109 °F) <i>Setaflash Closed Cup ASTM D3828</i>
Evaporation Rate (Butyl Acetate =1)	No data available
Flammability (solid, gas)	No data available
Lower explosion limit	No data available
Upper lower explosion limit	No data available
Vapor pressure	No data available
Relative Vapor Density (air = 1)	No data available
Relative Density (water = 1)	1.1385 at 20 °C (68 °F) <i>Digital Density Meter (Oscillating Coil)</i>
Water solubility	Soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Dynamic Viscosity	12.5 mPa.s at 25 °C (77 °F)
Kinematic Viscosity	No data available
Explosive properties	No <i>Thermal</i>
Oxidizing properties	No significant increase (>5C) in temperature.
Liquid Density	1.1385 g/ml at 20 °C (68 °F) <i>Digital density meter</i>
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

Section 10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of use.
Chemical stability:	Thermally stable at recommended temperatures and pressures.
Possibility of hazardous reactions:	Polymerization will not occur.
Conditions to avoid:	Active ingredient decomposes at elevated temperatures.
Incompatible materials:	Avoid contact with: Oxidizers
Hazardous decomposition products:	Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Nitrogen oxides.

Section 11. Toxicological information

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

As product: LD50, Rat, female, 4100 mg/kg

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product: LD50, Rabbit, male and female, > 5,000 mg/kg

Acute inhalation toxicity

No adverse effects are anticipated from single exposure to mist. Excessive exposure may cause irritation to upper respiratory tract (nose and throat).

As product: LC50, Rat, male and female, 4 Hour, Mist, > 5.4 mg/l

Maximum attainable concentration.

No deaths occurred at this concentration.

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Serious eye damage/ eye irritation

May cause moderate eye irritation.

May cause moderate corneal injury.

Sensitization

Did not demonstrate the potential for contact allergy in mice.

For respiratory sensitization: No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

For the active ingredient(s): In animals, effects have been reported on the following organs:
Kidney.

Carcinogenicity

For similar active ingredient(s). Triclopyr. Did not cause cancer in laboratory animals.

Teratogenicity

For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

For the minor component(s): Has caused birth defects in lab animals at high doses.

Reproductive toxicity

For similar active ingredient(s). Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

Mutagenicity

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

Section 12. Ecological information

Ecotoxicological information appears in this section when such data is available.

Toxicity

Acute toxicity to fish LC50, *Oncorhynchus mykiss* (rainbow trout), 96 Hour, 400 mg/l, OECD Test Guideline 203 or Equivalent.

LC50, *Lepomis macrochirus* (Bluegill sunfish), semi-static test, 96 Hour, > 100 mg/l

Acute toxicity to aquatic Invertebrates

EC50, eastern oyster (*Crassostrea virginica*), static test, 48 Hour, 56 - 87 mg/l, Method Not Specified.

LC50, *Daphnia magna* (Water flea), static test, 48 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent.

Acute toxicity to algae/aquatic plants

Based on information for a similar material:
Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/l in the most sensitive species tested.

ErC50, *Pseudokirchneriella subcapitata* (green algae), 72hr, Growth rate inhibition, 107 mg/l, OECD Test Guideline 201 or Equivalent

ErC50, blue-green alga *Anabaena flos-aquae*, 72 Hour, Growth inhibition, > 100 mg/l

EC50, *Lemna gibba*, 7 d, Growth inhibition, > 100 mg/l

Based on information for a similar material
ErC50, *Myriophyllum spicatum*, 14 day, 0.241 mg/l

Based on information for a similar material
NOEC, *Myriophyllum spicatum*, 14 day, 0.0191 mg/l

Persistence and degradability

Triclopyr Triethylamine Salt

Biodegradability: For similar active ingredient(s). Triclopyr. Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%).
For similar active ingredient(s). Triclopyr. Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Ethanol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.
10-day Window: Pass
Biodegradation: > 70%
Exposure time: 5 d
Method: OECD Test Guideline 301D or Equivalent

Theoretical Oxygen Demand: 2.08 mg/mg



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Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitizer: OH radicals

Atmospheric half-life: 2.99 d

Method: Estimated.

Balance

Biodegradability: No relevant data found.

Bioaccumulative potential

Triclopyr Triethylamine Salt

Bioaccumulation: For similar active ingredient(s). Bioconcentration potential is low (BCF < 100 or Log Pow <3).

Ethanol

Bioaccumulation: Bioaccumulation is unlikely. Bioconcentration potential is low (BCF < 100 or Log Pow <3).

Partition Coefficient: n-octanol/water(log Pow) = -0.31 Measured.

Balance

Bioaccumulation: No relevant data found.

Mobility in soil

Triclopyr Triethylamine Salt

For similar active ingredient(s).

Potential for mobility in soil is very high (Koc between 0 and 50).

Ethanol

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 1.0 Estimated.

Balance

No relevant data found.

Section 13. Disposal considerations

Disposal methods:

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

Section 14. Transport information

DOT

Proper shipping name	Combustible liquid, n.o.s. (Triclopyr Triethylamine Salt, Ethanol)
UN Number	NA 1993
Class	CBL
Packing Group	III

**Classification for SEA transport (IMO-IMDG):**

Proper shipping name	FLAMMABLE LIQUID, N.O.S. (Triclopyr Triethylamine Salt, Ethanol)
UN number	UN 1993
Class	3
Packing group	III
Marine pollutant	Triclopyr Triethylamine Salt
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Flammable liquid, n.o.s. (Triclopyr Triethylamine Salt, Ethanol)
UN number	UN 1993
Class	3
Packing group	III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

Section 15. Regulatory information

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Flammable (gasses, aerosols, liquids, or solids)
Serious eye damage or eye irritation
Specific target organ toxicity (single or repeated exposure)

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

Components	CASRN
Triclopyr Triethylamine Salt	57213-69-1

Pennsylvania Right-To-Know

The following chemicals are listed because of the additional requirements of Pennsylvania Law.

Components	CASRN
Ethanol	64-17-5

California Proposition 65

WARNING: This product can expose you to chemicals including Propylene oxide, Ethylene Oxide, which is/are known to the State of California to cause cancer, and Ethylene Oxide, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

United States TSCA Inventory (TSCA)

This product contains chemical substance(s) exempt from U.S. EPA TSCA Inventory requirements. It is regulated as a pesticide subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requirements.

**Federal Insecticide,
Fungicide and Rodenticide
Act**

EPA Registration Number: 62719-37-67690

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

DANGER

Corrosive

Causes irreversible eye damage

Harmful if swallowed or absorbed through skin

Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Section 16. Other information**Hazard Rating System****NFPA**

Health: 3 Fire: 2 Instability: 0

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
DOW IHG	Dow Industrial Hygiene Guideline
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) – Table Z-1 Limits for Air Contaminants
SKIN, DSEN, BEI	Absorbed via Skin, Skin Sensitizer, Biological Exposure Indices
STEL	Short-term exposure limit
TWA	Time Weighted Average

History**Date of issue mm/dd/yyyy:** 07/17/2018**Notice to reader**

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET



Renovate® OTF Aquatic Herbicide

Section 1. Identification

GHS product identifier : Renovate® OTF Aquatic Herbicide

Other means of identification : Not available.

EPA Registration No. : 67690-42

Relevant identified uses of the substance or mixture

Aquatic herbicide.

Supplier's details : SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm E.S.T.
www.sepro.com

Emergency telephone number (with hours of operation) : INFOTRAC - 24-hour service 1-800-535-5053

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms : Exclamation mark

Signal word : Warning

Hazard statements : Causes serious eye irritation.

Precautionary statements

Prevention : Wear eye or face protection. Wash hands thoroughly after handling.

Response : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.



Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Ingredient name	%	CAS number
Proprietary ingredient 1	60 - 70	-
Triclopyr Acetic Acid, Triethylamine Salt	14	57213-69-1
Proprietary ingredient 2	0.1 - 0.9	-

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Flush contaminated skin with plenty of water. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Irritating to mouth, throat and stomach.

Section 4. First aid measures

Over-exposure signs/symptoms

- | | |
|---------------------|--|
| Eye contact | : Adverse symptoms may include the following:
pain or irritation
watering
redness |
| Inhalation | : No known significant effects or critical hazards. |
| Skin contact | : No known significant effects or critical hazards. |
| Ingestion | : No known significant effects or critical hazards. |

Indication of immediate medical attention and special treatment needed, if necessary

- | | |
|-----------------------------------|--|
| Notes to physician | : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. |
| Specific treatments | : No specific treatment. |
| Protection of first-aiders | : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. |

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- | | |
|---------------------------------------|---|
| Suitable extinguishing media | : Use an extinguishing agent suitable for the surrounding fire. |
| Unsuitable extinguishing media | : None known. |

- | | |
|---|---|
| Specific hazards arising from the chemical | : No specific fire or explosion hazard. |
|---|---|

- | | |
|---|--|
| Hazardous thermal decomposition products | : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
halogenated compounds |
|---|--|

- | | |
|---|-------------------------------------|
| Special protective actions for fire-fighters | : No special measures are required. |
|---|-------------------------------------|

- | | |
|---|---|
| Special protective equipment for fire-fighters | : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. |
|---|---|

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- | | |
|------------------------------------|---|
| For non-emergency personnel | : No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. |
| For emergency responders | : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". |

Section 6. Accidental release measures

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Section 8. Exposure controls/personal protection

Skin protection

- | | |
|-------------------------------|--|
| Hand protection | : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. |
| Body protection | : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. |
| Other skin protection | : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. |
| Respiratory protection | : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. |

Section 9. Physical and chemical properties

Appearance

- | | |
|---|----------------------------|
| Physical state | : Solid. [Granular solid.] |
| Color | : Creamy grayish-tan. |
| Odor | : Ammoniacal. |
| Odor threshold | : Not available. |
| pH | : 7.8 [Conc. (% w/w): 1%] |
| Melting point | : Not available. |
| Boiling point | : Not available. |
| Flash point | : Not applicable. |
| Burning time | : Not available. |
| Burning rate | : Not available. |
| Evaporation rate | : Not available. |
| Flammability (solid, gas) | : Not available. |
| Lower and upper explosive (flammable) limits | : Not available. |
| Vapor pressure | : Not available. |
| Vapor density | : Not available. |
| Relative density | : 0.7 |
| Solubility | : Not available. |
| Solubility in water | : Not available. |
| Partition coefficient: n-octanol/water | : Not available. |
| Auto-ignition temperature | : Not available. |
| Decomposition temperature | : Not available. |
| SADT | : Not available. |
| Viscosity | : Not available. |

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: No specific data.
Incompatible materials	: Reactive or incompatible with the following materials: None known.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Renovate® OTF Aquatic Herbicide	LC50 Inhalation Vapor LD50 Dermal LD50 Oral	Rat Rat Rat	>2 mg/L >5000 mg/kg >5000 mg/kg	4 hours - -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Renovate® OTF Aquatic Herbicide	Eyes - Moderate irritant Skin - Non irritant	Rat Rat	- -	- -	- -

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Renovate® OTF Aquatic Herbicide	skin	Rat	Not sensitizing

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

There is no data available.

Specific target organ toxicity (repeated exposure)

There is no data available.

Aspiration hazard

There is no data available.

Section 11. Toxicological information

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

- Potential immediate effects** : No known significant effects or critical hazards.
- Potential delayed effects** : No known significant effects or critical hazards.

Long term exposure

- Potential immediate effects** : No known significant effects or critical hazards.
- Potential delayed effects** : No known significant effects or critical hazards.

Potential chronic health effects

- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

There is no data available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Triclopyr Acetic Acid, Triethylamine Salt	Acute EC50 15.3 mg/L Fresh water	Algae - Navicula pelliculosa	4 days
Proprietary ingredient 2	Acute EC50 775 mg/L Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 120 mg/L Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 80.7 mg/L	Daphnia - Daphnia magna	21 days
	Chronic NOEC 104 mg/L	Fish - Pimephales promelas	28 days
	Acute EC50 4400+ ppb Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 >10 mg/L Fresh water	Crustaceans - Ceriodaphnia dubia	48 hours
	Acute LC50 167 ppb Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

There is no data available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-



Section 14. Transport information

Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
United States inventory (TSCA 8b): Not determined.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Triclopyr Acetic Acid, Triethylamine Salt Proprietary ingredient 2	14 0.1 - 0.9	Yes. No.	No. No.	Yes. No.	Yes. Yes.	No. No.

SARA 313





Section 15. Regulatory information

	Product name	CAS number	%
Form R - Reporting requirements	Triclopyr Acetic Acid, Triethylamine Salt	57213-69-1	14
Supplier notification	Triclopyr Acetic Acid, Triethylamine Salt	57213-69-1	14

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

- Massachusetts** : The following components are listed: Proprietary ingredient 1
- New York** : None of the components are listed.
- New Jersey** : The following components are listed: Proprietary ingredient 1; Triclopyr Acetic Acid, Triethylamine Salt
- Pennsylvania** : The following components are listed: Proprietary ingredient 1
- California Prop. 65**

No products were found.

International regulations

- International lists** :
- Australia inventory (AICS)**: All components are listed or exempted.
 - China inventory (IECSC)**: Not determined.
 - Japan inventory**: All components are listed or exempted.
 - Korea inventory**: All components are listed or exempted.
 - Malaysia Inventory (EHS Register)**: Not determined.
 - New Zealand Inventory of Chemicals (NZIoC)**: All components are listed or exempted.
 - Philippines inventory (PICCS)**: Not determined.
 - Taiwan inventory (CSNN)**: Not determined.
- Chemical Weapons Convention List Schedule I Chemicals** : Not listed
- Chemical Weapons Convention List Schedule II Chemicals** : Not listed
- Chemical Weapons Convention List Schedule III Chemicals** : Not listed

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 1 * Flammability : 0 Physical hazards : 0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Health : 1 Flammability : 0 Instability : 0

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Section 16. Other information

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of issue mm/dd/yyyy	: 07/15/2015
Date of previous issue	: 04/15/2013
Version	: 4
Revised Section(s)	: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
Prepared by	: KMK Regulatory Services Inc.
Key to abbreviations	: ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

according to Regulation (EC) No. 1907/2006 as amended by (EC) No. 1272/2008

Section 1. Identification of the Substance/Mixture and of the Company/Undertaking

- 1.1 Product Code:** 17404
Product Name: Endothall
Synonyms: 7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid; Aquathol; Endothal Acid; Hydrothol; NSC 112771;
- 1.2 Relevant identified uses of the substance or mixture and uses advised against:**
Relevant identified uses: For research use only, not for human or veterinary use.
- 1.3 Details of the Supplier of the Safety Data Sheet:**
- Company Name:** Cayman Chemical Company
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
- Web site address:** www.caymanchem.com
- Information:** Cayman Chemical Company +1 (734)971-3335
- 1.4 Emergency telephone number:**
- Emergency Contact:** CHEMTREC Within USA and Canada: +1 (800)424-9300
CHEMTREC Outside USA and Canada: +1 (703)527-3887

Section 2. Hazards Identification

- 2.1 Classification of the Substance or Mixture:**
- Acute Toxicity: Oral, Category 3**
Acute Toxicity: Skin, Category 4
Skin Corrosion/Irritation, Category 2
Serious Eye Damage/Eye Irritation, Category 2
Specific Target Organ Toxicity (single exposure), Category 3

2.2 Label Elements:



GHS Signal Word: **Danger**

GHS Hazard Phrases:

H301: Toxic if swallowed.
H312: Harmful in contact with skin.
H315: Causes skin irritation.
H319: Causes serious eye irritation.
H335: May cause respiratory irritation.

GHS Precaution Phrases:

P261: Avoid breathing {dust/fume/gas/mist/vapors/spray}.
P264: Wash {hands} thoroughly after handling.
P280: Wear {protective gloves/protective clothing/eye protection/face protection}.

GHS Response Phrases:

P301+310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+352: IF ON SKIN: Wash with plenty of soap and water.
P304+340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy

to do. Continue rinsing.

P312: Call a POISON CENTER or doctor/physician if you feel unwell.

P321: Specific treatment {see ... on this label}.

P330: Rinse mouth.

P332+313: If skin irritation occurs, get medical advice/attention.

P337+313: If eye irritation persists, get medical advice/attention.

P362+364: Take off contaminated clothing and wash it before reuse.

GHS Storage and Disposal Phrases:

Please refer to Section 7 for Storage and Section 13 for Disposal information.

2.3 Adverse Human Health Causes serious eye irritation.

Effects and Symptoms: Causes skin irritation.

Harmful in contact with skin.

Material may be irritating to the mucous membranes and upper respiratory tract.

May be harmful by inhalation or skin absorption.

May cause respiratory system irritation.

Toxic if swallowed.

To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

Section 3. Composition/Information on Ingredients

CAS # / RTECS #	Hazardous Components (Chemical Name)/ REACH Registration No.	Concentration	EC No./ EC Index No.	GHS Classification
145-73-3 RN7875000	Endothall	100.0 %	205-660-5 607-150-00-1	Acute Tox.(O) 3: H301 Acute Tox.(D) 4: H312 Skin Corr. 2: H315 Eye Damage 2: H319 STOT (SE) 3: H335 H336

Section 4. First Aid Measures

4.1 Description of First Aid

Measures:

In Case of Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.

In Case of Skin Contact: Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

In Case of Eye Contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.

In Case of Ingestion: Wash out mouth with water provided person is conscious. Never give anything by mouth to an unconscious person. Get medical attention. Do NOT induce vomiting unless directed to do so by medical personnel.

Section 5. Fire Fighting Measures

- 5.1 Suitable Extinguishing Media:** Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.
Media: Use water spray to cool fire-exposed containers.
Unsuitable Extinguishing Media: A solid water stream may be inefficient.
- 5.2 Flammable Properties and Hazards:** No data available.
Hazards: No data available.
Flash Pt: No data.
Explosive Limits: LEL: No data. UEL: No data.
Autoignition Pt: No data.
- 5.3 Fire Fighting Instructions:** As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

Section 6. Accidental Release Measures

- 6.1 Protective Precautions, Protective Equipment and Emergency Procedures:** Avoid raising and breathing dust, and provide adequate ventilation.
As conditions warrant, wear a NIOSH approved self-contained breathing apparatus, or respirator, and appropriate personal protection (rubber boots, safety goggles, and heavy rubber gloves).
- 6.2 Environmental Precautions:** Take steps to avoid release into the environment, if safe to do so.
- 6.3 Methods and Material For Containment and Cleaning Up:** Contain spill and collect, as appropriate.
Transfer to a chemical waste container for disposal in accordance with local regulations.

Section 7. Handling and Storage

- 7.1 Precautions To Be Taken in Handling:** Avoid breathing dust/fume/gas/mist/vapours/spray.
Avoid prolonged or repeated exposure.
- 7.2 Precautions To Be Taken in Storing:** Keep container tightly closed.
Store in accordance with information listed on the product insert.

Section 8. Exposure Controls/Personal Protection

8.1 Exposure Parameters:

CAS #	Partial Chemical Name	Britain EH40	France VL	Europe
145-73-3	Endothall	No data.	No data.	No data.
CAS #	Partial Chemical Name	OSHA TWA	ACGIH TWA	Other Limits
145-73-3	Endothall	No data.	No data.	No data.

8.2 Exposure Controls:

- 8.2.1 Engineering Controls (Ventilation etc.):** Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- 8.2.2 Personal protection equipment:**
- Eye Protection:** Safety glasses
- Protective Gloves:** Compatible chemical-resistant gloves
- Other Protective Clothing:** Lab coat
- Respiratory Equipment (Specify Type):** NIOSH approved respirator, as conditions warrant.
- Work/Hygienic/Maintenance:** Do not take internally.

ce Practices: Facilities storing or utilizing this material should be equipped with an eyewash and a safety shower.
Wash thoroughly after handling.
No data available.

Section 9. Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

Physical States: ☐ Gas ☐ Liquid ☒ Solid

Appearance and Odor: A crystalline solid

Melting Point: No data.

Boiling Point: No data.

Flash Pt: No data.

Evaporation Rate: No data.

Flammability (solid, gas): No data available.

Explosive Limits: LEL: No data. UEL: No data.

Vapor Pressure (vs. Air or mm Hg): No data.

Vapor Density (vs. Air = 1): No data.

Specific Gravity (Water = 1): No data.

Solubility in Water: No data.

Solubility Notes: ~0.2 mg/ml in PBS (pH 7.2); ~15 mg/ml in EtOH, DMSO, & DMF;

Autoignition Pt: No data.

9.2 Other Information

Percent Volatile: No data.

Molecular Formula & Weight: C₈H₁₀O₅ 186.2

Section 10. Stability and Reactivity

10.1 Reactivity: No data available.

10.2 Stability: Unstable ☐ Stable ☒

10.3 Stability Note(s): Stable if stored in accordance with information listed on the product insert.

Polymerization: Will occur ☐ Will not occur ☒

10.4 Conditions To Avoid: No data available.

10.5 Incompatibility - Materials strong oxidizing agents

To Avoid:

10.6 Hazardous carbon dioxide

Decomposition or Byproducts: carbon monoxide

Section 11. Toxicological Information

11.1 Information on Toxicological Effects:	The toxicological effects of this product have not been thoroughly studied.
Chronic Toxicological Effects:	Endothall - Toxicity Data: Oral LDLO (man): 571 uL/kg; Oral LD50 (rat): 38 mg/kg; Intraperitoneal LD50 (mouse): 14 mg/kg; Endothall - Investigated as an agricultural chemical and reproductive effector. Only select Registry of Toxic Effects of Chemical Substances (RTECS) data is presented here. See actual entry in RTECS for complete information. Endothall RTECS Number: RN7875000

CAS #	Hazardous Components (Chemical Name)	NTP	IARC	ACGIH	OSHA
145-73-3	Endothall	n.a.	n.a.	n.a.	n.a.

Section 12. Ecological Information

12.1 Toxicity:	Avoid release into the environment. Runoff from fire control or dilution water may cause pollution.
12.2 Persistence and Degradability:	No data available.
12.3 Bioaccumulative Potential:	No data available.
12.4 Mobility in Soil:	No data available.
12.5 Results of PBT and vPvB assessment:	No data available.
12.6 Other adverse effects:	No data available.

Section 13. Disposal Considerations

13.1 Waste Disposal Method:	Dispose in accordance with local, state, and federal regulations.
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Section 14. Transport Information

14.1 LAND TRANSPORT (US DOT):

DOT Proper Shipping Name:	Toxic solids, organic, n.o.s. (Endothall)				
DOT Hazard Class:	6.1	POISON			
UN/NA Number:	UN2811		Packing Group:	II	



14.1 LAND TRANSPORT (European ADR/RID):

ADR/RID Shipping Name:	Toxic solids, organic, n.o.s. (Endothall)				
UN Number:	2811		Packing Group:	II	
Hazard Class:	6.1 - POISON				

14.3 AIR TRANSPORT (ICAO/IATA):

ICAO/IATA Shipping Name:	Toxic solids, organic, n.o.s. (Endothall)				
UN Number:	6.1		Packing Group:	II	
Hazard Class:	6.1 - POISON				

Additional Transport Information:	Transport in accordance with local, state, and federal regulations. When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.
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SAFETY DATA SHEET

Endothall

Page: 6 of 6

Revision: 12/20/2015

Section 15. Regulatory Information

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

CAS #	Hazardous Components (Chemical Name)	S. 302 (EHS)	S. 304 RQ	S. 313 (TRI)
145-73-3	Endothall	No	Yes 1000 LB	No

CAS #	Hazardous Components (Chemical Name)	Other US EPA or State Lists
145-73-3	Endothall	CAA HAP,ODC: No; CWA NPDES: No; TSCA: No; CA PROP.65: No

Regulatory Information Statement: This SDS was prepared in accordance with 29 CFR 1910.1200 and Regulation (EC) No.1272/2008.

Section 16. Other Information

Revision Date: 12/20/2015

Additional Information About This Product: No data available.

Company Policy or Disclaimer: DISCLAIMER: This information is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.



Safety Data Sheet

Issuing Date: 2017/09/29

Revision Date: 2018/11/13

Revision M

1. Identification of the Substance/Preparation and of the Company/Undertaking

Product Identifier

Turner Designs Part Numbers

: 6500-020, 6500-120, 6500-220, 8700-250

Product name

: KEYACID™ RHODAMINE WT LIQUID, CYANOFLUOR CAL CHECK SOLUTION

Supplier's details

Turner Designs
1995 N. First Street
San Jose, CA 95112-4220

Ph: 1-408-749-0994

Ph: 1-877-316-8049

Email: support@turnerdesigns.com

Emergency Telephone Number

CHEMTREC US: 1-800-424-9300

CHEMTREC WORLD: 1-703-527-3887

Recommended use of the chemical and restrictions on use

Synonyms

N/A

Recommended use

Industrial Use Only.

Uses advised against

No Information available

2. Hazards Identification

Classification

Not a dangerous substance or mixture according to the Globally Harmonized System (GHS)

EMERGENCY OVERVIEW

Signal word

Not Hazardous

The product contains no substances which at their given concentration, are considered to be hazardous to health

Appearance Red

Physical State Liquid

Odor No Information available

Precautionary statements

P281 – Use personal protective equipment as required

P262 – Do not get in eyes, on skin, or on clothing

P261 – Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray

P264 – Wash face, hands and any exposed skin thoroughly after handling

P270 – Do not eat, drink or smoke when using this product

P501 – Dispose of contents/ container to an approved waste disposal plant

Hazards Not Otherwise Classified (HNOC)

Other information

Unknown Acute Toxicity

98.2 percent of the mixture consists of ingredient(s) of unknown acute toxicity

3. Composition/information on Ingredients

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910. 1200).

4. First Aid Measures

First aid measures for different exposure routes

Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes lifting lower and upper eyelids. Consult a physician.
Skin Contact	Wash skin with soap and water.
Inhalation	Move to fresh air.
Ingestion	Rinse mouth.

Most important symptoms/effects, acute and delayed

Main Symptoms No Information available.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician Treat symptomatically.

5. Fire-fighting Measures

Suitable extinguishable media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media Keep away from heat and sources of ignition.

Specific Hazards Arising from the Chemical

No Information available.

Explosion Data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions Avoid contact with skin and the eyes. Use personal protective equipment. For personal protection, see section 8. Ensure adequate ventilation.

Environmental Precautions

Environmental Precautions Prevent further leakage or spillage if safe to do so.

Methods and materials for containment and cleaning up

Methods for Cleaning Up

Use personal protective equipment. Dam up. Cover liquid spill with sand, earth or other noncombustible absorbent material. Take up mechanical, placing in appropriate containers for disposal. Clean contaminated surface thoroughly.

7. Handling and Storage

Precautions for Safe Handling

Advice on safe handling

Avoid contact with skin, eyes, and clothing. Do not breathe vapors/dust. In case of insufficient ventilation, wear suitable respiratory equipment. Wear personal protective equipment. Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Provide appropriate exhaust ventilation at places where dust is formed. Do not eat, drink, or smoke when using this product. Use personal protection recommended in Section 8.

Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

Store locked up. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labeled containers. Store in accordance with the particular national regulations. Store in accordance with the local regulations.

Incompatible Products

None known based on information supplied.

8. Exposure Controls/ Personal Protection

Control Parameters

Exposure guidelines

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Exposure Controls

Engineering Measures

Showers
Eyewash stations
Ventilation systems. Apply technical measures to comply with the occupational exposure limits. Process enclosure and/or ventilation systems

Individual protection measures, such as personal protective equipment

Eye/Face Protection

Face-shield. Chemical resistant goggles must be worn. Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection. If splashes are likely to occur, wear: Goggles.

Skin and Body Protection

Skin and Body Protection. Wear protective gloves and protective clothing. Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn.

Hygiene measures

Do not eat, drink, or smoke when using this product.

9. Exposure Controls/ Personal Protection

Physical and Chemical Properties

**Physical State
Appearance**

Liquid
Red

Odor

No information available

<u>Property</u>	<u>VALUES</u>	<u>Remarks •Method</u>
pH	10.00	
Melting point		N/A
Boiling point/boiling range	< 110 °C / 230.00 °F °F	
Flash Point	< 121 °C / < 250.00 °F °F	
Evaporation Rate	no data available	
Flammability (solid, gas)	no data available	no data available
Flammability Limits in Air		
Upper Flammability Limit	No information available	
Lower Flammability Limit	No information available	
Vapor pressure	No information available	
Specific gravity	No information available	N/A
Solubility in Other Solvents	No information available	
Partition coefficient: n-octanol/water	No information available	
Autoignition Temperature	No Data Available	N/A
Decomposition temperature	No information available	
Kinematic viscosity	No Data Available	
Dynamic viscosity	No information available	
Explosive Properties	No information available	
Oxidizing properties	No information available	

Other information

Softening point	No information available
Molecular Weight	
VOC Content(%)	No information available
Density	No information available

10. Stability and Reactivity

Reactivity

No data available

Chemical Stability

Stability under recommended storage conditions

Hazardous Reactions

None under normal processing

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

None known based on information supplied

Hazardous decomposition products

May emit toxic fumes under fire conditions.

11. Toxicological Information

Information on Likely Routes of Exposure

Product Information

Inhalation	Avoiding breathing vapors or mists.
Eye Contact	Avoid contact with eyes.
Skin Contact	Avoid contact with skin.
Ingestion	Not an expected route of exposure.

Information on Toxicological Effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.
Germ cell mutagenicity No information available.
Carcinogenicity No information available.
Reproductive Toxicity No information available.
Specific target organ systemic Toxicity (single exposure) No information available.
Specific target organ systemic Toxicity (repeated exposure) No information available.
Aspiration Hazard No information available.

Numerical Measures of Toxicity –Product information

Unknown Acute Toxicity 98.2 percent of the mixture consists of ingredient(s) of unknown acute toxicity

The following values are calculated based on chapter 3.1 of the GHS document
A TEMix (oral) 39333 mg/kg

12. Ecological Information

Ecotoxicity

98.2% of the mixture consists of component(s) of unknown hazards to the aquatic environment

Persistence and Degradability

No information available.

Bioaccumulation

No information available.

Other Adverse Effects

No information available

13. Disposable Considerations

Waste treatment

Waste Disposal Methods Should not be released into the environment. Dispose of in accordance with local regulations. This material, as supplied, is not a hazardous waste according to state and federal regulations (40 CFR 261).

Contaminated Packaging Do not re-use empty containers. Dispose of in accordance with local regulations.

14. Transport Information

DOT

Description NOT REGULATED

MEX

NOT REGULATED

IATA

Description NOT REGULATED

IMDG

Description NOT REGULATED

RID

ADN

15. Regulatory Information

International Inventories

TSCA	Listed
EINECS/ELINCS	Listed
DSL	Not Determined
NDSL	Not Determined
PICCS	Not Determined
ENCS	Not Determined
IECSC	Not Determined
AICS	Not Determined
KECL	Not Determined
NZIoC	Not Determined

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS – European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL – Canadian Domestic Substances List/ Non-Domestic Substances List
PICCS – Philippines Inventory of Chemicals and Chemical Substances
ENCS – Japan Existing and New Chemical Substances
IECSC – China Inventory of Chemical Substances
AICS – Australian Inventory of Chemical Substances
KECL – Korean Existing and Evaluated Chemical Substances
NZIoC – New Zealand Inventory of Chemicals

RESTRICTIONS – REACH TITLE VIII No information available

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	NO.
Chronic health hazard	NO.
Fire hazard	NO.
Sudden Release of Pressure Hazard	NO.
Reactive Hazard	NO.

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the superfund amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations

International regulations

Mexico – Grade

Slight risk, Grade 1.

CANADA

WHMIS Note

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR.

WHMIS Hazard Class

Non-controlled

HMIS **Health Hazard 1** **flammability 1** **Physical hazard 0** **PERSONAL PROTECTION** **H**

16. Other Information

Revision Date 2018/11/13

Revision note No information available.

Restrictions on use No information available.

Contact Information Website www.turnerderdesigns.com

Disclaimer

The information provided on this SDS is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text

End of Safety Data Sheet

APPENDIX C SPILL RESPONSE EQUIPMENT PROCESS FLOW DIAGRAM

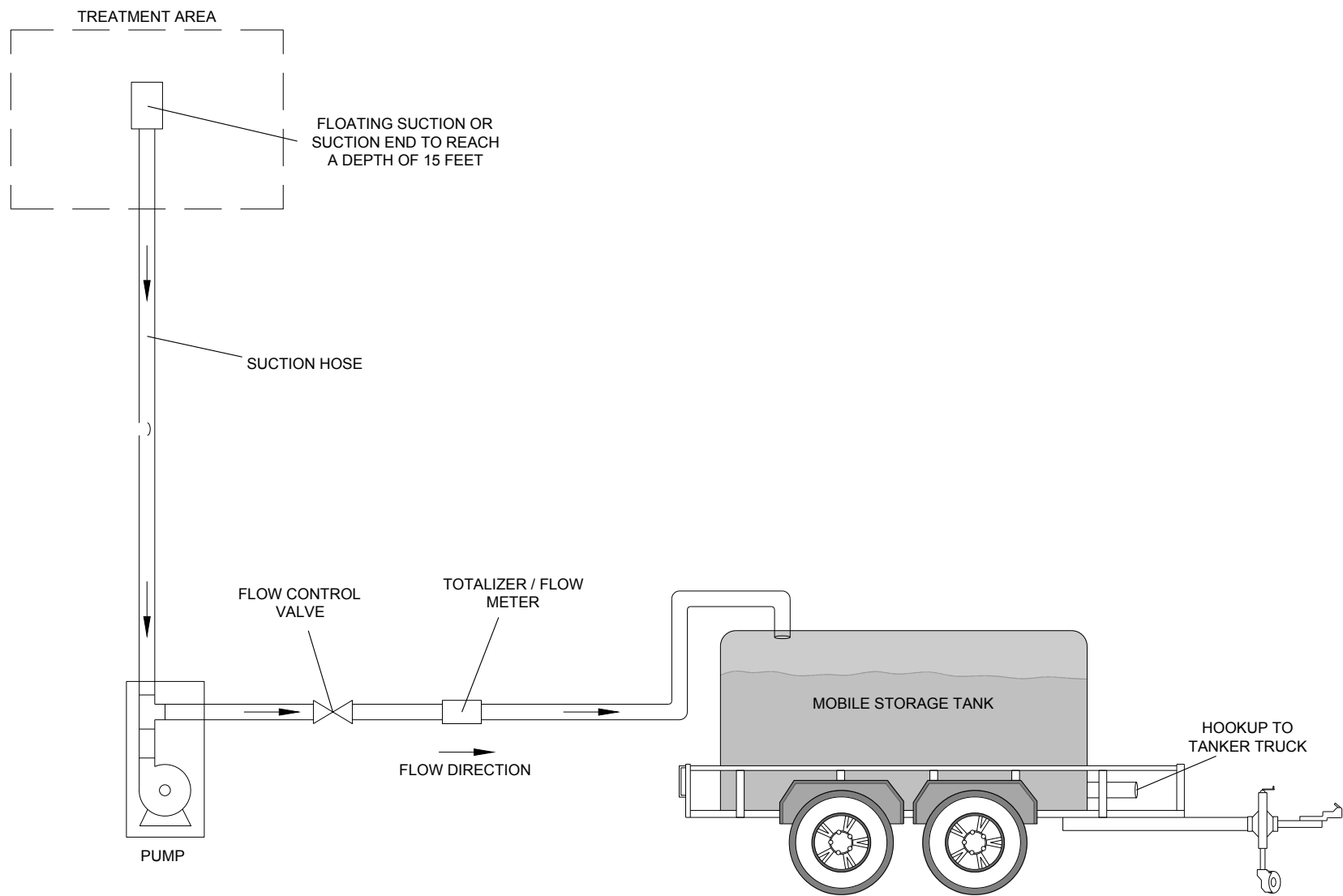


SPILL RESPONSE EQUIPMENT

In accordance with the Spill Prevention and Response Plan, **Section 7.0 SPILL RESPONSE**, a spill of herbicide chemical within the test sites (depending on quantity of material spilled, see **Section 7.4 Spill to Water Within a Test Site**) and or more importantly any quantity outside of the test sites (see **Section 7.5 Spill to Water Outside a Test Site**), will require mitigation from dedicated spill response equipment. Mitigation will include the use of hoses, pump(s) and a storage tank to extract and contain the spill within the lagoon waters (see Figure C-1 for a process flow diagram). Since extracted water will be contained and not be re-introduced into the test sites or disposed of within the Tahoe Basin, it will not need to be treated with granular activated carbon or other media.

In the event of a spill of herbicide chemical, RWT dye will be applied to the spill area (RWT would be applied only if RWT is not already being applied with an herbicide application at a CMT test site as required under the NPDES for the CMT), whether a liquid or granular herbicide spill, as an aid for visual identification of the spill. Water/spilled material will be extracted from the spill area and pumped directly into a large water tank (1,600 gallons minimum capacity). Floating hoses will be deployed in the event of a granular herbicide spill, and a hose capable of reaching a water depth of 15 feet will be deployed in the event of a liquid herbicide spill. Water will be extracted at a maximum rate of 300 gallons per minute, and the spill response time for the contractor will be a maximum of 20 minutes. Contained water will be transported and disposed of offsite by the Stratus Engineering Associates LLC; disposal documentation will be provided to the CMT Project Team.





NOTES:

1. EXTRACTED WATER TO BE DISPOSED OF OFF-SITE
2. MAXIMUM EXTRACTION RATE TO BE 300 GALLONS PER MINUTE.



STRATUS ENGINEERING ASSOCIATES

TAHOE KEYS PROPERTY OWNERS ASSOCIATION
356 ALA WAI BOULEVARD
SOUTH LAKE TAHOE, CALIFORNIA

PROCESS FLOW DIAGRAM - HERBICIDE SPILL RESPONSE SYSTEM

FIGURE

C-1

Attachment H. Summary Monitoring Actions

Attachment H CMT Monitoring Activity Summary								
Monitoring Activities	Responsible Group	Type of CMT Treatment, Site #	Type of Monitoring/location	Start of Monitoring	Frequency / Timing	Sampling Methods/Conditions	End of Monitoring	Notes:
General Water Quality								
Standard WQ (Real-time)	TKPOA	Inside all CMT sites	Multiprobe (temp, Do, pH, turbidity, ORP, conductivity)/(Red dots on Attachment C)	Pre (baseline)	3x per week (MWT; T THr, Sat)	Mid-depth; 11am-2 pm	November	End date may change due to weather
Standard WQ (Real-time)	ESA/MTS/Blankenship	Outside CMT sites	Multiprobe (temp, Do, pH,)(Yellow Dots on Attachment C)	Begin Posttreatment 3DAT	3 x/week/	Bottom, Middle, Surface: 10am to 3pm	November	End date may change due to weather
MiniDOT (DO/Temp)(loggers)	Stratus	All CMT sites	Auto- logged data/ upper and lower water column; logs DO and temperature hourly. (fixed on anchored stations: See Fig. 3.2 in QAPP)	Pre- (baseline)	hourly Logged data is downloaded weekly	Data is downloaded to laptop in field	November	Last download date may change due to weather
BMI (macroinvertebrates/sediments)	ESA	All CMT Sites	Ponar or other acceptable grab device (two per site)	Pre-	One Pre; one year later	Protocol same as 2019 Baseline	Year 2 or 3 (To be determined)	Final samples taken in Year 3
Herbicide Residues/degradants (Rhodamine WT see below)	Blankinship and Assoc.							
1. Sediments (active ingredients)		Herbicide sites 1,2,3,5,8,9,15,19	Sediment sampler (Ponar, or core device, as appropriate) (2 per site)	Pre-	60 DAT (Begin on/about July 25, 2020)	Use best sampling methods to obtain re	Approximately July 25- August 2, 2022	Complies w/ NPDES/MMRP; Curtain barriers will be removed approximately 21 DAT
2. Water: Inside Herbicide Sites		Herbicide Sites: 1,2,3,5,8,9,15,19 (Designated "TA 1,2, "etc. for each site)	Active ingredients/degradants; Composite of surface, mid-, bottom water column (See Blue dots Attachment C)	Pre-	Pre,7,14,21 DAT (May extend beyond 21 DAT)	Peristaltic pump/ weighted tubing to proper depths	21 DAT (unless extended due to analyte levels) Contingency sampling may be	1.Sampling may continue if herbicide levels are not sufficiently reduced
3. WATER: Outside Containment curtains: (Receiving Water) (AKA "Compliance" sampling sites)		Herbicide treatments. Map locations	Rhodamine WT Presence; if RWT present grad samples taken for herbicide/degradants (Attachment C : Yellow diamonds (ORW- RHC-1, -2, -3) (designated buoy/ map sampling stations)	3 DAT	48 hour intervals; may be increased if detections warrant	Flow-through fluorometer; mid-depth	require per APAP if RWT is detected above baseline levels beyond curtains.	2. 5% of samples will be in duplicates and analyzed
4. Water outside Sites <u>AND</u> inside containment curtains		All herbicide site areas	RWT dye and Active ingredients/degradants; RED diamonds (Attachment C: "IRW-1," to IRW-9				21 DAT (Unless extended dur to analyte levels)	3. Lahontan request "split" samples for their separate analysis (TBA)
5. Water at "Contingency" stations		Outside curtains in West Lagoon areas	Yellow "Stars" (Attachment C) Rhodamine WT; if RWT present grab samples are taken for herbicide active ingredient analysis.	If RWT detected at Yellow Stars	48 hr. intervals	Composite sample (Surface, mid-, bottom using peristaltic pump)	When two consecutive samples non-detect at least 48 hour apart within 7 days.	RWT detected. (Note MRP, NPDES maps and "Yellow diamond" only if RWT detect)
Herbicide Residue: well water	Stratus	Groundwater source	Grab sample for active wells (raw water) TKPOA Wells 1,2,3	24 hr. pre-	Post-at 48 hr. intervals for 14 days		14 DAT after last herbicide application (approximately June 13)	Analysis for active ingredients: endothall and triclopyr
Rhodamine WT dye	Blankinship	Sites adjacent to Herbicide sites and at sites designated on CMT map and outside barrier curtains	Flow--through fluorometer capable of detecting RWT at 0.05 ppb at mid-depth/ (designated in Attachment C)	Pre-, 48hr after treatment	3x/week in receiving water Map; and at 48 hr. interval outside barrier curtains.		Detection outside curtains will trigger additional water samples for herbicides per APAP/ MRP contingency locations on map	Note added RWT monitoring at stations near Sites 14,16, 19 Threshold of "detection": consistent levels during 2 min. pumping resulting fluorometer reading above natural water "Pre/ Baseline" fluorometer reading
Nutrients in water (See specific sites below.)								
1. Herbicide sites	ESA	Herbicides: (1,2,3,5,8,9,15,19)	Three stations per site, composited: Three stations per site, composited; taken at bottom, mid- and surface.	Pre Pre	Pre, 7DAT, weekly thereafter		30 DAT	1.Curtain barriers are due to be removed approx. 21DAT 2. For all nutrients: To ensure sample integrity analytical lab must receive sample within 48 of
2. UV only sites	ESA	UV- Only: 22,23, 24	Three stations per site, composited; taken at bottom, Mid- and surface.	Pre	Pre, 14 DAT, weekly thereafter		30 Days past last UV treatment Unless weather prohibits (e.g. ice cover)	Weekly Sampling day may vary by 24-48 hrs. to accommodate
3. Control Sites	ESA	Control (untreated): 16, 17, 18, 20, 21	Three stations per site, composited; taken at bottom, mid- and surface.	Pre	Pre, 7DAT, weekly thereafter		30 Day past last UV treatment	shipping/ receiving requirements to ensure sample integrity 3. 5% of samples will be duplicates to and analyzed
4. Laminar Flow Aeration	ESA	LFA (Laminar Flow Aeration): 25,26	Three sample stations, composited as with other CMT nutrient sites	Pre	One spring and one fall sampling (e.g. May and September)		Fall, 2022	Sample station should be approximately evenly spaced in LFA site and GPS referenced
5. Sequential UV (Post Bottom Barrier Removal)	ESA	Sequential UV (after BB removal)	nutrient Selected BB sites	Post UV	Within 10 to14 days Post UV: one time		Fall. 2024	Sequential Treatments were only done in 2024
Macrophyte Responses: Hydroacoustic scans	TKPOA	All	Continuous scanning of each site using Lowrance unit traveling at 3-5 MPH or similar to produce reliable scan	Pre-	bi-weekly (ever two weeks)		November	Weather may prohibit November sampling access
Physical samples ("Pt./Rake Sampling")	ESA/MTS	All	Rake grabs: 30 per site, spaced to cover deep and shallow areas; still photograph record of each rake grab; plants on each grab are rated (1-5) for plant condition Underwater video optional depending on conditions	Pre	bi-weekly (every two week)		November	1. If unknow species found, retain for correct identification. 2. May also use underwater video if clarity permits for examples of plant condition, growth and composition 3. Weather may prohibit November access
					For Sequential Treatments: Pre and 10 to 14 days post treatment	Adjust number of samples similar to Group B sites.	November	
Lanthanum in water (contingent)	Aquatechnex: Applications/ Sampling ESA -lab	Sites in which Phoslock is applied	Two station per site; composite of surface, mid-, bottom	Pre Phoslock use	weekly until levels = control levels		La levels = control site	This monitoring only required if Total P exceeds control sites AND cyanotox-forming algae present.
Hydrologic Conditions W. Channel	TKPOA	Prerequisite Conditions to apply herbicides in CMT sites	Water Flow Direction/ West Channel	10 days pre herbicide	30 min intervals; 10 min. recording	Flow meter (OTT MF- Pro/ or equivalent sensitivity	October	Provide to Lahontan Water Board: Daily downloads and average flow conditions 24 hr. prior to start of herbicide applications; continue measuring during applications

Attachment I. Sample Integrity/Prevention of Cross-Contamination

Equipment	Rinse water/Use	Initial Disposal/Disposition of rinse water	Final Disposal/Disposition of rinse water	Rationale
Grab sampling: Peristaltic pump/tubing (for nutrients and for herbicide / degradant samples)	Deionized water (DI): <u>Herbicides</u>: Flush 2-3x volume of tubing "dead space" (i.e. volume contained within the tubing), between sampling depths and between stations and sites. <u>Nutrients</u>: Flush 2-3x with DI between stations and replace tubing between sites. After composited sample is collected, container used to produce composite will be rinsed 3x with 50 ml DI by inserting the sample end in DI and pumping the DI through to waste container or into site/station where sample was taken.	At each sampling station, temporary capture between depths samples (plastic 2- L bottle with screwcap closure). No rinseate will be retain on board since it will be deposited into the site/station from which the sample was taken.	Rinseate collected will be deposited into treatment site at location of station sampled. Rinseate collection container will be rinsed 3x with 50 ml DI water; rinse water will be deposited into treatment site at sample station.	1. Herbicide treatments sites will contain water with active ingredients and potential degradants. Rinse water will potentially have some level of herbicide/degradants but at lower concentration due to dilution by rinsing. 2. Minimum risk is obtained by adding diluted rinseate back to the site rather than maintaining rinse water on-board in containers. 3. For Control sites and Receiving water, likelihood of herbicide residue is minimal: the collected and diluted rinseate will be deposited back to the site at sample station.
Petit Ponar or Push/core Grab Sampler (for sediment samples)	Tap (potable) water will be used to rinse the Ponar or Push/core sampler between stations and sites. After grab sample is bagged, the sampling devices will be rinsed overboard with 500ml tap water or enough to remove residual sediments from the device.	There is no interim containment of rinseate.	Rinseate will be deposited directly overboard at each sampling station before moving to next station or site.	The BMI samples are NOT used for herbicide or degradant monitoring. The only cross-contamination risk is for mixing of sediment (and potentially associated BMI). By rinsing the sampling device with tap water overboard, the potential for mixing of sediments from different stations and sites is eliminated.
Multiprobe sensors, Real-time/Water Quality (YSI or Hydrolab)	Deionized water: After data is recorded for three depths, sensor array and housing is rinsed once with 100 ml DI. This is done using a hand-held wash bottle or similar device. Rinsing will be completed before moving to next station or site. Rinseate is directed back to the site/station from which the data was obtained.	There is no interim containment of rinseate	During rinse, sensor array is held outside the vessel and rinseate is allowed to drain directly back into the site at each station. Between stations/sites, sensor array is maintained in enclosed protective container designed for this use by manufacturer.	The activity is NOT designed to sampling or remove water for analysis. Only water adhered to the probe array/housing is likely to contain herbicide or degradants. By rinsing these areas directly back into the site, this minimizes risks of storing and transporting rinseate on board. The addition of small volume of diluted rinesate to the site/station will not affect treatment conditions.
Macrophyte Sampling (Double tined rakes)	Tap (potable) or clean field water. After plants are removed from rake and secured in bags, the rake "head" (double tine) is rinsed in the surface water at the station and then rinsed with 200 ml of tap water; or plants can be allowed to drip and then be bagged or deposited in a pail for later disposal.	There is no interim containment of rinseate	During rinsing, rake head is held out of vessel and rinse water is allowed to drain back into the station/site surface water.	This sampling is to collect plants, <u>not water or its constituents, therefore tap/potable water is sufficient to use.</u> Plants are removed from the rake and bagged. Therefore, the potential source of cross-contamination is the <i>rake if it contains residual plants or plant fragments or sediment</i> . The volume of tap (potable) or clean field water rinse will not affect site conditions and will minimize risk of containing and transporting rinseate.

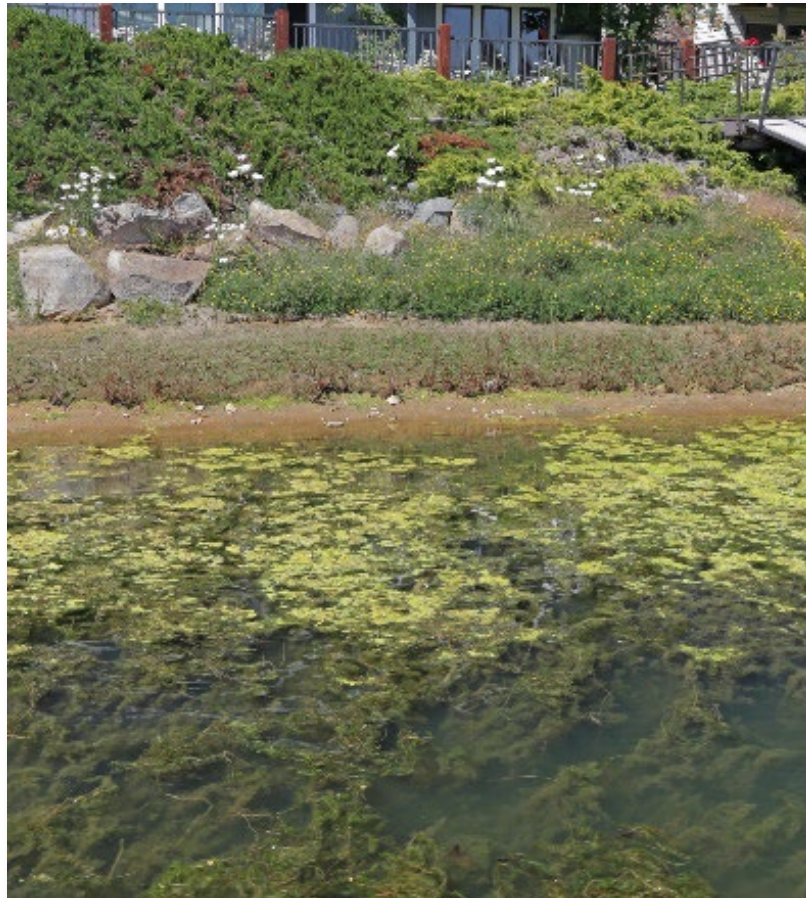
Tahoe Keys Lagoons Aquatic Weed
Control Methods Test

miniDOT loggers Only loggers in herbicide treated sites need to be rinsed with DI However all loggers should be kept clear of plant fragments, sediment and algal growth	Tap (potable) water. Each logger is rinsed overboard with 25-50 ml tap water before it is downloaded. A manual /squeeze wash bottle is used to rinse the logger. After downloading loggers are re-connected to the mooring chain.	There is no interim collection of rinseate.	Rinseate is deposited directly back to the surface water at the station from which the loggers were removed.	The activity does NOT include sampling or removal of water at the station or site. Therefore, the only contamination would result from handling the logger for downloading. Persons handling loggers will use a new pair of disposable nitrile gloves for each station and site. Use of tap water us sufficient to rinse adhered water. Loggers are not moved from their station in each site; they are temporarily disconnected from their anchoring chain for on-board downloading. Returning rinseate overboard to the station/site will not affect conditions and minimizing risk of transporting and storing rinseate.

Attachment J.
Lanthanum Modified Clay Application Plan (LMCAP)

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Lanthanum-Modified Clay Application Plan



Revised – May 18, 2022



Tahoe Keys Property Owners Association

356 Ala Wai Blvd

South Lake Tahoe, CA 96150

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Lanthanum-Modified Clay Application Plan

Submitted to



State of California Regional Water Quality Control Board
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

Submitted by



Tahoe Keys Property Owners Association
356 Ala Wai Blvd
South Lake Tahoe, CA 96150

Prepared by



Sierra Ecosystem
Associates

In association with
Dr. Lars Anderson

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ATTACHMENT A	LMC Key Requirements Checklist
ATTACHMENT B	Product Labels

1.0 BACKGROUND

The Control Methods Test Project (CMT or Project) will test aquatic weeds management using standalone-treatments of herbicides, ultraviolet (UV-C) light, Laminar Flow Aeration (LFA), and combination treatments of herbicide and UV-C light in the first year of the proposed CMT. These methods will be followed in Years 2 and 3 of the CMT with non-herbicide follow-up methods, including spot treatments using bottom barriers, diver-assisted suction/hand pulling, and UV-C treatments. Follow-up methods would be dependent on the target plants present, size of infestation, and location of infestation. Figures 1 and 2 show the currently identified areas of the Tahoe Keys that will receive treatment and what types of treatment will be deployed in each area. Final CMT site selection will be identified and approved by the Lahontan Regional Water Quality Control Board (Lahontan) in May 2022.

Figure 1. Proposed CMT Treatment Areas

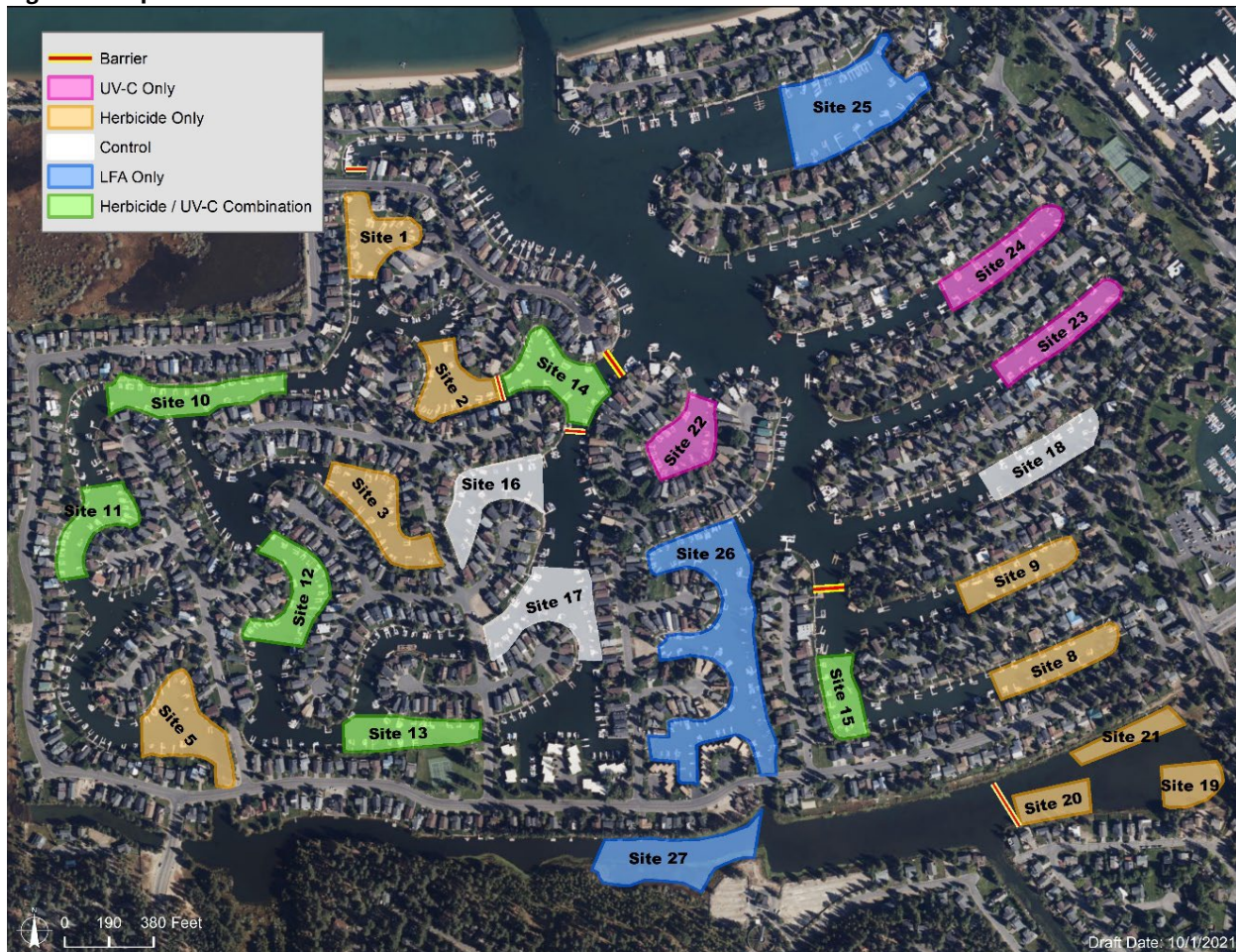


Figure 2. Proposed Control Methods Test Site Locations, New Sites 13, 14, 19, 20, and 21

The objective of this Lanthanum-Modified Clay Application Plan (LMCAP) is to comply with Section VII.B of the National Pollutant Discharge Elimination System (NPDES) Permit No. CA6202201/Order No. R6T-2022-0004.

2.0 CONTINGENCY APPLICATION OF LANTHANUM MODIFIED CLAY

With treatments in the areas identified above in Figures 1 and 2, levels of total phosphorus could become elevated, thus triggering the need for lanthanum-modified clay (LMC) applications to minimize harmful algal blooms (HABs). LMC (Phoslock), once applied, would reduce the available phosphorus levels in the water column. Per the Project NPDES Permit, LMC is permitted only in sites treated with herbicide, UV-C, or LFA, and is not otherwise permitted.

2.1 Criteria

Should levels of total phosphorous become elevated above 10% of the composite levels of the control sites in addition to the occurrence of a HAB at a test site in response to phosphorus released during plant decomposition following herbicide or UV-C treatment, Tahoe Keys Property Owners Association (TKPOA) may apply LMC to treatment sites, as applicable. Should both increased levels of total phosphorus and HABs be detected, TKPOA would consult with Lahontan staff to determine if application of LMC shall be applied.

Once applied, LMC would reduce the available phosphorus levels in the water column. Per the CMT Project NPDES Permit, LMC is permitted only in sites treated with herbicide, UV-C, or LFA, and is not otherwise permitted.

The LMC application concentration is not to be greater than the recommended label application rates (see Attachment B, Product Labels). LMC is permitted to reduce the phosphorus concentration between the water quality objective of 0.008 mg/L and 0.005 mg/L. In no case shall the quantity of LMC discharged be greater than the amount necessary to reduce the phosphorus in the waterbody to attain the target range of total phosphorus concentration.

The following criteria must be met prior to application of LMC:

- Visual inspection of a treated area indicates a possible HAB,
- Phosphorus concentrations in the water column for the treated areas are higher than 10% of the levels in that of a comparable control site(s),
- Cyanobacteria indicators are at caution levels or higher¹, and
- Alkalinity of the water in the area to be treated is greater than 20 mg/L.

Requirements of pre- and post-LMC treatment activities are summarized in Table 1 below. Should LMC be applied, monitoring of water and sediment in treated areas will follow that outlined in Table 1.

¹ Caution levels are: Microcystins $\geq$ 0.8 μ g/L; Presence of anatoxin-a; and Cylindrospermopsin $\geq$ 1.0 μ g/L

Table 1. Overview of Required LMC Monitoring

Parameter	Monitoring Variable	Monitoring Method
Visual (Pre-Treatment)	Visual inspection	- Monitoring area description - At each water and sediment sampling event - Appearance of waterway (color, sheen, clarity) - Weather conditions
Standard (Pre-Treatment)	- Temperature - pH - Turbidity - Dissolved oxygen - Total Phosphorus	YSI Handheld Meter/Grab Sample
Water Grab Sample (Post-Treatment)	- Free Lanthanum - Alkalinity - Total Suspended Solids - Free Reactive Phosphorus - Total Phosphorus	- Composite sample from surface, mid-depth, and near-bottom - Every 7 days until receiving water limitations are achieved for 2 consecutive events at a minimum of 48 hours apart
Sediment Grab Sample (Post-Treatment)	Total Phosphorus	- Petite Ponar Grab Sampler or similar device - Composite sample (mixed equal volumes from at least 3 Ponar grabs) - Every 7 days until receiving water limitations are achieved for 2 consecutive events at a minimum of 48 hours apart 2 samples from each monitoring location

2.2 Notification Requirements

An exceedance in composite (top, middle, bottom water column) samples total phosphorus in UV-C or herbicides site water column total phosphorus greater than 10% above control composite (top, middle, bottom water column) total phosphorus will initiate the following actions:

- Notification within 24 hours of documented exceedance (through monitoring regime within the APAP), to Lahontan staff of the exceedance levels and location(s) (sites).
- Proposed mitigation action to reduce observed total phosphorus exceedance to levels in control sites, as outlined below.
- Activation of the LMCAP components (provided below) that specify modified LMC application procedures (outlined below) using named modified clay product if and only if this action is directed in writing by Lahontan staff after their having reviewed the level and locations of any total phosphorus exceedances.

2.3 Product Information and Protocols

Implementation of LMCAP total phosphorus mitigation measures. The following actions and specifications apply to any and all CMT herbicide or UV-C sites in which total phosphorus exceedance occurs, and in which Lahontan has directed mitigation to be implemented.

Product Used

Phoslock is sold by SePro Corporation (see product labeling attached in Attachment B).

Method of Application

Either slurry (tank mixture) or granular according to label instructions and requirements. Preference will be to granular formulation and will depend upon location(s) of exceedance but in all cases shall be based upon minimizing risk of spill (see Spill Prevention below). Product will be applied via vessel and with standard distribution equipment (granular dispersal or slurry injection). Product will be applied by a certified applicator (QAL) and trained crew (see personnel and training requirements below).

Rate/Amount of Phoslock Used

The application vessel will traverse the site using 2 to 3 evenly spaced transit lines to facilitate a uniform dispersion of applied Phoslock in the water column. The application is made to the water surface. The total phosphorus levels and volume of water in the site will be used to determine the amount of Phoslock using the product manufacturer recommendation:

Total phosphorus based on monitored total phosphorus level:

$$\text{Volume of water (ac-ft)} \times \text{phosphorus concentration (ppb)} \times 0.0027 = \text{lbs. of total phosphorus}$$

For water column reduction in total phosphorus recommended rate of using a 200:1 ratio of Phoslock to total phosphorus.

Example 1:

$$\text{For 10-acre} \times 5 \text{ feet (50 ac-ft), and a level of 20 ppb total phosphorus} \times 0.0027 = 2.7 \text{ lbs. of total phosphorus}$$

$$\text{Amount of Phoslock: } 200 \text{ lbs} \times 2.7 = 540 \text{ lbs. of Phoslock}^2$$

Example 2: Typical CMT Site

$$1.5 \text{ acres} \times 8 \text{ ft (12 ac-ft)} \times 10 \text{ ppb total phosphorus} \times 0.0027 = 0.32 \text{ lbs total phosphorus}$$

$$\text{Amount of Phoslock: } 200 \text{ lbs} \times 0.32 = 64 \text{ lbs. of Phoslock}$$

Post LMC Application

² This equates to a concentration of about 4 ppm of Phoslock and about 200 ppb of lanthanum.

In order to confirm lanthanum concentrations in the water column, mid-depth water samples will be taken and shipped for Lanthanum analysis to an approved (by Lh laboratory and a 48-hour turnaround time will be required. To determine effects of Phoslock, the previously scheduled water quality sampling (grab sample composited from top, middle, and bottom of the water column) will be continued. Reports of the total phosphorus levels will be provided within 48 hours of sampling time. Adjustments to the Phoslock applications (e.g., additional treatments) will be made in consultation with Lahontan staff.

All applications will adhere to label instructions/use rates and safety precautions and related measures (e.g., PPE). All required PPE, limitations, and precautions on the product label (Attachment B) will be followed and the QAL will document same with date, product name, Lot Number (if available) and list of staff who have read the product label. When the application is completed, the QAL will document the actions noted below in "Records and Logs."

2.4 Daily Briefings

At the commencement of CMT treatments, and each morning thereafter, the QAL will hold a 30-minute briefing with supporting staff before handling, loading, or use of Phoslock. The briefing shall review the day's proposed CMT treatments, monitoring activities and coordination with others conducting CMT activities. The briefing shall review cautionary actions to prevent spills and how to respond if a spill occurs. The briefing will review the communications equipment conditions, use, and sequence of communications.

2.5 Records and Logs

Contents of records and logs will include the following:

- Applicator name(s) and QAL certification number(s) and names of QAL field supporting staff.
- Documentation of types of PPE used and signed by each person who wears PPE.
- Date, time, location (i.e., CMT site) and methods used to apply product, product name and Lot Number, if available. (Product name is "Phoslock")
- Name, make, model of application equipment
- Date and method used to calibrate Phoslock application equipment and results of calibrations.
- Amount of Phoslock product applied, and formulation of product and projected concentration of lanthanum.
- Visual observation of pre/post application (e.g., general water clarity or turbidity, evenness of application)
- Any incidences of spills and how these were responded to (see Spill prevention/containment)
- Documentation that the LMCAP was adhered to via check list of key requirements (see Attachment A).

3.0 APPLICATOR QUALIFICATIONS / REQUIREMENTS

The following qualifications and experience are required:

- Experience and qualifications with similar LMC applications
- Knowledge and familiarity with the Project NPDES, APAP and MMRP
- QAL will provide record(s) of training (including support staff), QAL certification number and currency (i.e., still within certificate period of use)
- Training shall consist of correct product label understanding, correct use of PPE, protocols for loading, applying Phoslock, and protocols for responding to spillage and notifications

4.0 BEST MANAGEMENT PRACTICES (BMPS)

Application BMPs:

- QAL and supervised staff shall comply with all applicable directions, limitations, conditions, application methods and equipment, PPE and all other safety and environmental protection, disposal and containment requirements stated in the respective label for all LMC products specified. QAL shall review the label, application schedule and application logistics to ensure all labelling is complied with.
- Prior to application, turbidity curtains (if not already in place) are to be installed in the locations identified on Figure 1 or Figure 2, dependent on Lahontan approval of final CMT test sites.
- Loading of LMC on to watercraft utilized for chemical applications (i.e., discharges) must be done with the vessel behind the double turbidity curtains (within the site treatment zones).
- Only enough LMC product to apply to a single CMT site to achieve targeted final concentration shall be loaded onto the application vessel at any time.
- Rate of application must be consistent with product label requirements for the targeted phosphorus reduction.

5.0 SPILL PREVENTION/CONTAINMENT

Once the level of total phosphorus is known, the amount of Phoslock needed will be calculated (see above examples). Only the amount of Phoslock necessary to reduce total phosphorus levels to “control” site or below levels will be used. Only the amount of Phoslock needed for a single site treatment will be loaded on the application vessel. To avoid spillage on land Phoslock containers will be kept closed until loaded on the vessels, behind turbidity curtains, and will only be opened at application site in preparation for use. All opened containers will be re-sealed with closures (caps/lids/ or suitable closure methods) with which they were received once the contents have been transferred to the application device/systems.

To prevent migration of Phoslock to receiving waters, applications will only be made within designated CMT sites that received treatments with UV-C or herbicides. Only the amount needed to reduce total phosphorus to control site levels will be used. All of herbicide and UV-C / Herbicide Combination sites are strategically separated from receiving waters that are adjacent to the West Channel by double barriers (i.e., two turbidity curtains at each point).

Therefore, the same preventative actions (curtain installations) that prevent herbicide residues from entering West Lagoon receiving water connected directly to the West Channel:

1. During the post-CMT treatment period, water will be entering the Keys lagoons and thus potential movement of Lanthanum will be further reduced.
2. Due to incoming water from Lake Tahoe proper to the Keys West lagoon, when curtains are removed, there will be additional dilution of Lanthanum concentrations beginning approximately 21 to 30 days after treatment.

Taken together, it is extremely unlikely that Lanthanum from Phoslock applications will reach the receiving water which connects to Lake Tahoe proper via the West Channel.

In the event of a spill in the water, outside the application vessel, and within the turbidity curtain delineated area, the location will be GPS-referenced and the approximate amount of Phoslock spilled will be documented immediately. If the spillage does not exceed the planned application amount for the site, no further action will be taken. If the spillage is likely to result in exceeding the planned total application amount for that site by more than 10%, any further applications planned will be stopped and Lahontan will be notified immediately. The cause(s) of spill will be ascertained within one hour after the event and that information will be provided to Lahontan along with remedial measure to prevent a recurrence. Regardless of the amount of spillage, water samples (in duplicate) from mid-depth will be taken within 6 hours of the event, and 24 hours after the event, and the sample will be sent to a laboratory for analysis to determine lanthanum concentration (at 20 µg/liter detection). Results of analysis will be reported to Lahontan within 48 hours after receipt of the sample by the laboratory.

6.0 RESPONSE TO EXCEEDANCE(S) IN RECEIVING WATER

If either inadvertent spillage (see above), miscalculation, or other unanticipated conditions appears that it may result in levels above that required for reduction of total phosphorus, application(s) will immediately cease. Lahontan will be notified within 24 hours of receipt of analysis documenting exceedance. The date, time, site, and level of exceedance will be reported to Lahontan. The QAL and TKPOA will consult with Lahontan to resolve the most effective response such as installation of additional turbidity (barriers) curtains directly at the CMT site in exceedance or continuing to monitor for lanthanum daily.

Attachment A

LMC Key Requirements Checklist

DRAFT Template:
**Documentation of Adherence to Lanthanum-Modified Clay Application Plan
 (LMCAP)**

A. Objective:

Confirmation that the QAL and supporting staff have complied with requirements in the LMCAP.

B. Documentation:

Implementation of LMCAP TP mitigation measures.

Table 1. LMC Application Checklist

Actions:	QAL (Initial)	TKPOA Review (Initial)	Notes/other verifications (and Initial)
Date of Document Completion:			
Staff (Full Name):			
Product used			
Training (QAL; support staff)			
Daily Morning Briefing			
Application Method(s)			
Spill Prevention/Containment			
Correct amount applied			
Label compliance			
Integrity of Containments			
Exceedance Response			
Records and Logs:			
• Date/time of application(s)			
• Location(s) (CMT site)			
• Amount Phoslock applied			
• Spillage or miscalculation?			
• Reporting/Communications (TKPOA, Lahontan)			
• Site observations (anomalies?)			
Overall Adherence to LMCAP Gaps? Omissions?			

Attachment B

Product Labels

Specimen Label

PHOSLOCK®

Phosphorus Locking Technology

Phosphate Sequestering Agent



For use in aquatic systems to reduce phosphorus and improve water quality.

Keep Out of Reach of Children

In the case of emergency endangering health or the environment involving this product, have the package label with you and call **INFOTRAC** at **1-800-535-5053**.

DIRECTIONS FOR USE

For best results, distribute uniformly over the surface of the waterbody, or the area targeted for application, as an aqueous slurry. Under certain conditions Phoslock granules may also be applied directly to the water based on management objectives and site conditions. For applications to waters with alkalinity less than 20 ppm, lower application rates may be needed. For site specific rate and treatment recommendations, contact SePRO Corporation at **1-800-419-7779**.

NSF/ANSI 60

Tested and certified against NSF/ANSI 60 by Water Quality Association (WQA). The maximum application rate is 80 ppm when applied to drinking water. This seal does not imply enhanced safety or efficacy.



NSF/ANSI 60

Precaution: Avoid ingestion, inhalation, contact with eyes and skin. Breathing dust may be irritating. For large volume applications, the use of a dust protection mask is recommended.

FIRST AID

If on skin or clothing	• Remove contaminated clothing • Immediately rinse skin with water for 15 to 20 minutes. • Seek medical attention if skin irritation persists.
If in eyes	• Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. • Seek medical attention if eye irritation persists.
If inhaled	• Immediately move to fresh air; if person is not breathing, call 911 or an ambulance, then give artificial respiration.
If swallowed	• Do not induce vomiting unless instructed to do so by a doctor.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact **INFOTRAC** for emergency medical information: **1-800-535-5053**.

Specimen Label

PHOSLOCK®

Phosphorus Locking Technology

Phosphate Sequestering Agent

STORAGE AND DISPOSAL

Do not contaminate food, feed or water by storage or disposal.

Storage: Store in original container and keep closed. Store in a dry place.

Container Handling: Non-refillable Container (non-rigid, ANY size): Do not reuse or refill this container. Completely empty bag into application equipment. Offer for recycling if available. If recycling not available, then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

WARRANTY DISCLAIMER

SePRO Corporation warrants that this product conforms to the chemical description on the product label. Testing and research have also determined that this product is reasonably fit for the uses described on the product label. To the extent consistent with applicable law, SePRO Corporation makes no other express or implied warranty of fitness or merchantability nor any other express or implied warranty and any such warranties are expressly disclaimed.

MISUSE

Federal law prohibits the use of this product in a manner inconsistent with its label directions. To the extent consistent with applicable law, the buyer assumes responsibility for any adverse consequences if this product is not used according to its label directions. In no case shall SePRO Corporation be liable for any losses or damages resulting from the use, handling or application of this product in a manner inconsistent with its label.

For additional important labeling information regarding SePRO Corporation's *Terms and Conditions of Use, Inherent Risks of Use and Limitation of Remedies*, please visit <http://seprolabels.com/terms> or scan the image below.



FPL20170412

Phoslock is a registered trademark of Phoslock Water Solutions Ltd. Always read and follow label directions. ©Copyright 2017 SePRO Corporation.

Manufactured for: SePRO Corporation 11550 North Meridian Street, Suite 600, Carmel, IN 46032 U.S.A.



Safety Data Sheet

Issuing Date: 2017/09/29

Revision Date: 2018/11/13

Revision M

1. Identification of the Substance/Preparation and of the Company/Undertaking

Product Identifier

Turner Designs Part Numbers

: 6500-020, 6500-120, 6500-220, 8700-250

Product name

: KEYACID™ RHODAMINE WT LIQUID, CYANOFLUOR CAL CHECK SOLUTION

Supplier's details

Turner Designs
1995 N. First Street
San Jose, CA 95112-4220

Ph: 1-408-749-0994

Ph: 1-877-316-8049

Email: support@turnerdesigns.com

Emergency Telephone Number

CHEMTREC US: 1-800-424-9300

CHEMTREC WORLD: 1-703-527-3887

Recommended use of the chemical and restrictions on use

Synonyms

N/A

Recommended use

Industrial Use Only.

Uses advised against

No Information available

2. Hazards Identification

Classification

Not a dangerous substance or mixture according to the Globally Harmonized System (GHS)

EMERGENCY OVERVIEW

Signal word

Not Hazardous

The product contains no substances which at their given concentration, are considered to be hazardous to health

Appearance Red

Physical State Liquid

Odor No Information available

Precautionary statements

P281 – Use personal protective equipment as required

P262 – Do not get in eyes, on skin, or on clothing

P261 – Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray

P264 – Wash face, hands and any exposed skin thoroughly after handling

P270 – Do not eat, drink or smoke when using this product

P501 – Dispose of contents/ container to an approved waste disposal plant

Hazards Not Otherwise Classified (HNOC)

Other information

Unknown Acute Toxicity

98.2 percent of the mixture consists of ingredient(s) of unknown acute toxicity

3. Composition/information on Ingredients

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910. 1200).

4. First Aid Measures

First aid measures for different exposure routes

Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes lifting lower and upper eyelids. Consult a physician.
Skin Contact	Wash skin with soap and water.
Inhalation	Move to fresh air.
Ingestion	Rinse mouth.

Most important symptoms/effects, acute and delayed

Main Symptoms No Information available.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician Treat symptomatically.

5. Fire-fighting Measures

Suitable extinguishable media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media Keep away from heat and sources of ignition.

Specific Hazards Arising from the Chemical

No Information available.

Explosion Data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions Avoid contact with skin and the eyes. Use personal protective equipment. For personal protection, see section 8. Ensure adequate ventilation.

Environmental Precautions

Environmental Precautions Prevent further leakage or spillage if safe to do so.

Methods and materials for containment and cleaning up

Methods for Cleaning Up

Use personal protective equipment. Dam up. Cover liquid spill with sand, earth or other noncombustible absorbent material. Take up mechanical, placing in appropriate containers for disposal. Clean contaminated surface thoroughly.

7. Handling and Storage

Precautions for Safe Handling

Advice on safe handling

Avoid contact with skin, eyes, and clothing. Do not breathe vapors/dust. In case of insufficient ventilation, wear suitable respiratory equipment. Wear personal protective equipment. Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Provide appropriate exhaust ventilation at places where dust is formed. Do not eat, drink, or smoke when using this product. Use personal protection recommended in Section 8.

Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

Store locked up. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labeled containers. Store in accordance with the particular national regulations. Store in accordance with the local regulations.

Incompatible Products

None known based on information supplied.

8. Exposure Controls/ Personal Protection

Control Parameters

Exposure guidelines

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Exposure Controls

Engineering Measures

Showers
Eyewash stations
Ventilation systems. Apply technical measures to comply with the occupational exposure limits. Process enclosure and/or ventilation systems

Individual protection measures, such as personal protective equipment

Eye/Face Protection

Face-shield. Chemical resistant goggles must be worn. Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection. If splashes are likely to occur, wear: Goggles.

Skin and Body Protection

Skin and Body Protection. Wear protective gloves and protective clothing. Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn.

Hygiene measures

Do not eat, drink, or smoke when using this product.

9. Exposure Controls/ Personal Protection

Physical and Chemical Properties

**Physical State
Appearance**

Liquid
Red

Odor

No information available

<u>Property</u>	<u>VALUES</u>	<u>Remarks •Method</u>
pH	10.00	
Melting point		N/A
Boiling point/boiling range	< 110 °C / 230.00 °F °F	
Flash Point	< 121 °C / < 250.00 °F °F	
Evaporation Rate	no data available	
Flammability (solid, gas)	no data available	no data available
Flammability Limits in Air		
Upper Flammability Limit	No information available	
Lower Flammability Limit	No information available	
Vapor pressure	No information available	
Specific gravity	No information available	N/A
Solubility in Other Solvents	No information available	
Partition coefficient: n-octanol/water	No information available	
Autoignition Temperature	No Data Available	N/A
Decomposition temperature	No information available	
Kinematic viscosity	No Data Available	
Dynamic viscosity	No information available	
Explosive Properties	No information available	
Oxidizing properties	No information available	

Other information

Softening point	No information available
Molecular Weight	
VOC Content(%)	No information available
Density	No information available

10. Stability and Reactivity

Reactivity

No data available

Chemical Stability

Stability under recommended storage conditions

Hazardous Reactions

None under normal processing

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

None known based on information supplied

Hazardous decomposition products

May emit toxic fumes under fire conditions.

11. Toxicological Information

Information on Likely Routes of Exposure

Product Information

Inhalation	Avoiding breathing vapors or mists.
Eye Contact	Avoid contact with eyes.
Skin Contact	Avoid contact with skin.
Ingestion	Not an expected route of exposure.

Information on Toxicological Effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.
Germ cell mutagenicity No information available.
Carcinogenicity No information available.
Reproductive Toxicity No information available.
Specific target organ systemic Toxicity (single exposure) No information available.
Specific target organ systemic Toxicity (repeated exposure) No information available.
Aspiration Hazard No information available.

Numerical Measures of Toxicity –Product information

Unknown Acute Toxicity 98.2 percent of the mixture consists of ingredient(s) of unknown acute toxicity

The following values are calculated based on chapter 3.1 of the GHS document
A TEMix (oral) 39333 mg/kg

12. Ecological Information

Ecotoxicity

98.2% of the mixture consists of component(s) of unknown hazards to the aquatic environment

Persistence and Degradability

No information available.

Bioaccumulation

No information available.

Other Adverse Effects

No information available

13. Disposable Considerations

Waste treatment

Waste Disposal Methods Should not be released into the environment. Dispose of in accordance with local regulations. This material, as supplied, is not a hazardous waste according to state and federal regulations (40 CFR 261).

Contaminated Packaging Do not re-use empty containers. Dispose of in accordance with local regulations.

14. Transport Information

DOT

Description NOT REGULATED

MEX

NOT REGULATED

IATA

Description NOT REGULATED

IMDG

Description NOT REGULATED

RID

ADN

15. Regulatory Information

International Inventories

TSCA	Listed
EINECS/ELINCS	Listed
DSL	Not Determined
NDSL	Not Determined
PICCS	Not Determined
ENCS	Not Determined
IECSC	Not Determined
AICS	Not Determined
KECL	Not Determined
NZIoC	Not Determined

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS – European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL – Canadian Domestic Substances List/ Non-Domestic Substances List
PICCS – Philippines Inventory of Chemicals and Chemical Substances
ENCS – Japan Existing and New Chemical Substances
IECSC – China Inventory of Chemical Substances
AICS – Australian Inventory of Chemical Substances
KECL – Korean Existing and Evaluated Chemical Substances
NZIoC – New Zealand Inventory of Chemicals

RESTRICTIONS – REACH TITLE VIII No information available

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	NO.
Chronic health hazard	NO.
Fire hazard	NO.
Sudden Release of Pressure Hazard	NO.
Reactive Hazard	NO.

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the superfund amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations

International regulations

Mexico – Grade

Slight risk, Grade 1.

CANADA

WHMIS Note

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR.

WHMIS Hazard Class

Non-controlled

HMIS **Health Hazard 1** **flammability 1** **Physical hazard 0** **PERSONAL PROTECTION** **H**

16. Other Information

Revision Date 2018/11/13

Revision note No information available.

Restrictions on use No information available.

Contact Information Website www.turnerderdesigns.com

Disclaimer

The information provided on this SDS is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text

End of Safety Data Sheet

Rhodamine WT has been approved as a tracer dye in potable water in the United States (1).

Rhodamine WT is related to rhodamine B, a tracer in common use in the 1960s. It was developed to overcome a disadvantage of rhodamine B, absorption on suspended sediment. The same modification was expected to reduce toxicity, and limited testing bore this out.

Rhodamine WT was an immediate success as a tracer in marine systems and in wastewater. While it was also used in potable water, such use was occasionally forbidden on the grounds that it did not have formal Federal approval for such use. Rhodamine WT is now approved for such use. A brief history follows.

While the EPA has sole responsibility for identifying those substances which may be used as tracers (2), the Food and Drug Administration (FDA) does issue policy statements. The FDA did issue such a policy statement on 22 April 1966 concerning rhodamine B (3). A temporary tolerance limit for ingestion of rhodamine B was set at 0.75 mg per day. Based on normally expensed water consumption, the tolerance would not be exceeded unless the concentration approaches 370 parts per billion (PPB). Noting that 30 PPB may be detected visually in a glass of water, and 10 PPB is visible in larger volume such as a clear reservoir, the FDA pointed out that if the dye is not visible, the tolerance would not be exceeded. The USGS, a large user of fluorescent dye tracers, directed that the concentration should not exceed 10 PPB at the intake of a water supply (4). The visual and instrumental detectability of rhodamine WT, based on active ingredient, is about the same as rhodamine B (rhodamine WT is supplied as a 20% aqueous solution).

Ten parts per billion may not sound like much to the uninitiated, but it is a thousand times the limit of detectability guaranteed by Turner Designs on its Model 10 Series Fluorometers (5). Background fluorescence caused by fluorescent materials in the water being studied usually limits detectability. But even so, measurements can be made to 0.1 part per billion of rhodamine WT (active ingredient), in raw sewage!

On April 10, 1980, Dr. Joseph A. Cotruvo of the U.S. EPA issued a memo stating that the EPA considers rhodamine WT to be equivalent to rhodamine B (1). More recently, the following policy letter was sent to Crompton and Knowles:

United States Environmental Protection Agency
Washington, D.C. 20460
Aug 2 1988

Office of Water

Ms. Janice Warnquist
Chemical Safety Manager
Crompton and Knowles Corporation
P.O. Box 341 (500 Pear Street)
Reading, Pennsylvania 19603

Dear Ms. Warnquist:

The Criteria and Standards Division (Office of Drinking Water) has reviewed the available data on chemistry and toxicity of Rhodamine dyes. We would not anticipate any adverse health effects resulting from the use of Rhodamine WT as a fluorescent tracer in water flow studies when used with the following guidelines.

- A maximum concentration of 100 micrograms/liter Rhodamine WT is recommended for addition to raw water in hydrological studies involving surface and ground waters.
- Dye concentration should be limited to 10 micrograms/liter in raw water when used as a tracer in or around drinking water intakes.
- Concentration in drinking water should not exceed 0.1 micrograms/liter. Studies which result in actual human exposure to the dye via drinking water must be brief and infrequent. This level is not acceptable for chronic human exposure.

- In all of the above cases, the actual concentration used should not exceed the amount required for reasonably certain detection of the dye as required to accomplish the intended purpose of the study.

The Criteria and Standards Division recommends that Rhodamine B not be used as a tracer dye in water flow studies.

This advisory supersedes all earlier advisories issued by EPA on the use of fluorescent dyes as tracers in water flow studies. This advisory is granted on a temporary basis only.

EPA is terminating its voluntary additives advisory program as announced in the Federal Register (53 FR, 25586, July 7, 1988). A copy of the Federal Register Notice is enclosed for your convenience. All EPA advisory opinions issued within the framework of the additives program will expire on April 7, 1990.

Our opinion concerning the safety of this tracer dye does not constitute an endorsement, nor does it relate to its effectiveness for the intended use. If this letter is to be used in any way, we require it to be quoted in its entirety.

Sincerely,

Arthur H. Perler, Chief
Science and Technology Branch
Criteria and Standards Division

Enclosure

REFERENCES

1. Cotruvo, J. A., RHODAMINE WT AND B, Memo to P. J. Traina, dated April 10, 1980
2. Letter from A. D. Laumbach, FDA, to George Turner, dated 7 June 1977
3. POLICY STATEMENT ON USE OF RHODAMINE B DYE AS A TRACER IN WATER FLOW STUDIES, Department of Health, Education and Welfare, dated 22 April 1966
4. Kilpatrick, F. A., DOSAGE REQUIREMENTS FOR SLUG INJECTIONS OF RHODAMINE BA AND WT DYES, U. S. Geological Survey, Prof. Paper 700-B, B250-253 (1970)
5. FIELD FLUOROMETRY, Monograph available at no charge from Turner Designs

Attachment K. Notifications (Homeowners)

From: **Tahoe Keys POA** <info@tahoekeyspoa.org>

Date: Thu, May 5, 2022 at 12:28 PM

Subject: Controlled Methods Test (CMT) – Weekly Update: May 5th, 2022

To: Rick & Angela Lind <rkbind55@gmail.com>

(This is your weekly update regarding the Controlled Methods Test (CMT) sent to you from the TKPOA Owner Communication Working Group (comprised of volunteer Homeowners). We are committed to providing our fellow TKPOA Homeowners with these weekly updates as the ultimate schedule for the CMT remains fluid and is significantly dependent on weather, environmental and other factors that are largely out of TKPOA's control.)

URGENT Homeowner Assistance: We need more docks for TKPOA work boats and **12** power sources for required aeration inside all herbicide and UV test areas. If you think you're in a position to help, please contact the TKPOA Water Quality team at 530-542-6444, ext. 275. Communications committee volunteers will be canvassing/calling property owners to find volunteers. *Please note, if you are willing to help, TKPOA will assure the protection of your docks by providing bumpers for the boats being docked. *

CMT Schedule Update – No major schedule changes. The key dates are:

1. May 5th - 10th : turbidity curtain installation begins in Lake Tallac
2. May 8th : last day for boat movement in/out of the restricted areas A, B, and C
3. May 9th : restricted areas A and B are closed; turbidity curtain installation begins in West Lagoons
4. May 16th : significant baseline sampling of water quality and plant composition
5. May 25th : target date for start of herbicide application

Environmental Factors: Weather conditions continue to be a major focus of the CMT project management team. Regarding the major categories of snowpack, lake levels and water temperatures, we continue to regularly monitor all of these factors.

1. The lake level is currently at 6,224.28', which is similar to last week's reading. Projected rise in May is +4 inches.
2. Water temps are at/near the required 60 degrees F in most locations and are rising.
3. The current snowpack data suggests that we have a greater than 90% chance of "inflow" into the Keys from Lake Tahoe at the beginning of the May 23, 2022 test window. The critical doppler device to measure flow from the lake into the lagoons will be installed this week to confirm that data.

Request for Relocation of Site #14 – Update: The CMT project implementation is proceeding on the assumption that Site #14 will be relocated as reflected in APAP Amendment #2. Please see the revised map on <https://www.keyswedsmangement.org/cmt-project>.

For additional information and updates, please refer to the TKPOA Water Quality website at www.keysweedsmanagement.org or follow us on Instagram at @tahoekeyspoa_wq. You can also contact the TKPOA Association Office, at 530-542-6444, Monday – Friday from 8:30AM – 4:30PM, Saturday and Sunday from 10:00AM – 2:00PM.

If you are interested in sharing dock space for TKPOA boats, please contact the TKPOA Water Quality Department directly, please call 530-542-6444, ext. 275 Monday – Friday from 8:30AM – 4:30PM or by email at waterquality@tahoekeyspoa.org.

Attachment L. Macrophyte Sampling/Survey Protocols

There are several methods typically used for sampling submersed aquatic vegetation (SAV), including those prescribed for the CMT. The methods chosen for the CMT provide specific types of data on the distribution, abundance, relative composition and condition (i.e., “health status”) of macrophyte populations and communities. Taken together, and by comparing Pre-CMT conditions and conditions in untreated “Control” sites, these methods provide a robust assessment of CMT treatment effects on both target aquatic weeds and desirable native aquatic plants. For all methods used, the number and location of samples should provide a representation of the general site plant populations. In order to comply with the NPDES, MRP and other regulatory considerations, the following methods described here will be used.

However, see notes specifically concerning “Pt. Sampling” and options for additional (not substitute) methods such as quadrat sampling in conjunction with “Pt. Sampling”, at the discretion of the Contractor and with approval of TRPA.

Hydroacoustic scanning: These methods provide excellent, rapid assessment of SAV presence and abundance (“biovolume” as a surrogate for biomass).

Hydroacoustic scanning devices: These are sonar signal type, transducer generated sound waves typically used in “fish finders”. Most modern units are very capable of detecting SAVs, their biovolume and average plant height and providing a digital (GPS referenced) record. This method rarely provides species identification or species composition unless the population is known and is monospecific.

For use in all CMT sites the following protocols should be followed

- a) Ensure that the scanning devices are working properly, and that the external transducer is free of debris.
- b) Log in the GPS units (integrated into the scanning device) and identify the date and time of scanning activity.
- c) Produce sufficient scan tracks to cover each CMT site (this may require 3-4 tracks). Ensure that boat speed is steady and slow enough to generate reliable data (ca. 3-5 MPH)
- d) Periodically check the transducer to be sure it’s clear of debris.
- e) When a scan event is done, record the event in the daily logbook and upload to the CMT Project Manager.
- f) Upload the scan data to BioBase, a third party data processing service to obtain the following for the CMT sites:
 - 1) “Heat map” showing cover of SAV and biovolume
 - 2) SAV canopy (plant) height.
 - 3) Bathymetry (depth contours).
- g) Frequency: Scans are made at Pre-CMT treatments (within 21 days before treatments and at two-week intervals beginning at 14 DAT and continuing until November unless weather prohibits.

Reporting: Results of scans (including heat maps) should be provided to the CMT Project Manager within 7 business days after scanning activity.

Physical “Point” sampling: This approach employs a simple, double-tined rake (e.g., a “thatch” rake) attached to a telescoping pole and is done from a boat at the surface of the water. This method is not impaired by poor visibility (e.g., high turbidity) and does not require divers (e.g., SCUBA). Another advantage of this method is that it reduces “sample bias” because the person doing the raking usually cannot see the plants on the bottom and relies on a transect and point reference only. The most important advantage is that the physical sample can be observed for species and condition of plants.

The disadvantage is that each rake “point” is small as rakes to be used are typically about 20 inches long and 6-8 in. wide, and the person raking may not use consistent techniques. For this reason, the following methods are suggested to minimize variability and to retain the SAV sample on the rake:

- a) Rake samples are made along a prescribed transect at set intervals (such as every 100-200 ft) such that the site sampled has been assessed with enough “points” to determine the species presence (frequency of detection), and relative composition per rake sample. The transects should encompass the center and sides of the site.
- b) For the CMT, 30 samples per site are taken: 10 represent the center of the site (e.g., along one or two transects), and 5 are taken on each near-shore area (2-4 ft. depths).
- c) Use the same rake or identical rake configurations (i.e., rake-head) for all CMT sampling.
- d) Always have a floating line (e.g., polypropylene) attached to the end of the rake handle to retrieve a rake that has been dropped: They sink!
- e) A sampling team member (not the person raking) signals when/where a sample is to be taken (usually based on a GPS track or permanent landmark along a transect)
- f) Rake Use and data recording:

The keys to this process is consistent raking methods and retention of the “captured” SAV on the rake tines:

- 1) Begin the sample at the surface by holding the rake vertical and slowly rotate the rake IN ONE DIRECTION ONLY as it is pushed to the bottom.

Caution: Do NOT stop rotating the rake and DO NOT reverse rotating direction because this can cause plants to be dislodged from the rake.

- 2) When the rake reaches the bottom CONTINUE ROTATING IN THE SAME DIRECTION 360 degrees (full circle) and then while continuing to rotate, slowly pull up the rake to the surface and on to the deck of the boat or in the boat.

Precautions: DO NOT allow the rake to go toward the bottom while retrieving because this may dislodge plants.

- 3) Identify the species present on the rake and estimate the relative abundance of each species captured on the rake.

Examples: if only one species is present: 100% species “a” if two species are present in about equal abundance: 50% for each species.

If three species are present in about equal abundance: 30-32% each (+/- a few percentages won't matter)

If NO SAV are captured: “NONE” (The sample counts in the total for that site.)

- 4) Provide a “condition rating” for species present on each rake sample:

Plant Condition Rating Scale

Condition Score	Description
1	Plants are barely recognizable, decomposing or decomposed with disintegrating leaves, stems, roots, rhizomes and any attached reproductive parts (flowers, fruit, seed, turions).
2	Plants may be defoliated, stems/shoots/ roots are recognizable but disintegrating. Plant tissues are easily pulled about with minor physical force. Reproductive parts are disintegrating or abnormal.
3	Plants may have defoliated stem/shoots, but stems and shoots, and roots are mostly intact firm; reproductive structures (if present) are intact. Some plants may have moderate symptoms above.
4	Only some plants or parts of plants are partially defoliated or have “pale” leaves; most plant parts are otherwise intact, green, and appear normal: stems, shoots, rhizomes, roots reproductive parts (if present)
5	Plants are consistently intact, firm, and appear normal with green leaves, shoots, stems; rhizome and roots are firm and intact; reproductive parts if present are intact, firm and otherwise appear normal.

- g) Plant “Condition” and recording data: If the condition of plants is needed a 1-5 ranking scale is used for each species (attached) where 5= a healthy, robust plant; 1=dead or decomposed plant.

NOTE: Either the driver or other crew member records the observations made by the person doing the raking. However, species confirmation may be made by others in the sampling crew if there are questions. If an unknown species is captured it should be retained (e.g., Ziplock bag in a cooler), the sample number or waypoint (GPS reference) noted for later plant ID.

- h) Rake cleaning between sampling points: After recording data from the rake sample, remove all plants from the rake and retain in waste bags to keep the work area uncluttered and reduce the potential for “double” counting of species.

i) Data Summary.

Presence/Absence: For a given sampling site, the percent of rake samples in which a given species is captured provide the (1) “frequency of occurrence”, which could range from 0 to 100% (100 % if the species was present if ALL samplings); (2) Relative Abundance, which is the percent of the total species for each rake sample; and (3) Condition rating scores. Data should be summarized and reported in both tabular format and in graphic format such as “pie” charts, which are very useful to show relative abundance by species.

j) Reporting: Results of sampling should be reported to the Contract Manager (TRPA) and the CMP Project Manager at monthly intervals following the beginning of the first sampling events.

Note: Additional Method Option. At the discretion of the Contractor and with prior approval of the Contract Manager, the following methods can be used.

Additional Quadrat Sampling Option: Quadrat (physical, areal) is sampling within a specified area formed by a square frame placed underwater within the plant community or stand. This method typically employs a known area (e.g., 0.25 sq. meter or one sq. meter) for delineated samples size (= one “quadrat”). Multiple quadrats are sampled, usually by divers (e.g., SCUBA), who place the quadrat along a pre-determined linear transect. The SAV within the quadrat can be either photographed (if conditions permit) and the relative proportion of species in the quadrat are recorded. The SAV inside the quadrat may also be removed by hand cutting at the sediment layer, or hand pulled. The removed plants can be carefully bagged and brought the surface for processing (e.g. drying for dry weight /unit area, as well as species composition). Visibility and water currents can interfere with this type of sampling. It is typically more time consuming than other methods.

Protocols to be used:

- a) Construct either 0.25 sqm or 1.0 sq. meter square quadrates. These should be made from either metal, aluminum, fiberglass (which will tend to stay on the bottom), or from schedule 40 or schedule 80 PVC that has several holes drilled along its sides to allow water to enter to prevent excessive buoyancy.
- b) The number of quadrats should provide a reasonable cover for the CMT site, such a 5-10 quadrats per site, and should include deep areas as well as near-shore shallow areas.
- c) Using pre-determined linear transects, divers place quadrats at regular intervals along the transect.
- d) Once a quadrat is in place, divers can photograph plants in the quadrat (if possible), and visually note and record the relative abundance and condition of each species.
- e) If an unknown species is present the diver may carefully remove a portion of the shoot and/or reproductive structure (if present) for subsequent identification.

- f) Data are summarized to show frequency of occurrence and relative species abundance in a site in a tabular format and graphically such as bar graphs and “pie” charts similar to data summaries described for the “Pt. Sampling” methods.
- g) If this method is used, it is suggested that locations of quadrats are in close proximity to known “Pt. Sampling” locations (such as within 2 to 3 ft) so that data from the two methods can be compared. For this purpose, it is suggested that 10 quadrats (and 10 associated Pt. samples) are included in each CMT site used.
- h) If these methods are used, it is suggested that quadrat sampling include at least one “control site” and at least one “Herbicide Only” Site, one “Combination Site” and one “UV Only” Site.
- i) Since the comparison between “Pt. Sampling” and “Quadrat Sampling” are “paired” data points (See g above), then simple Paired T-test can be used as long as N is the same (i.e., one-to-one for each location and for each type of CMT treatment).

Attachment M. CMT Sample Station ID Codes

Site	Treatment	Station ID
1	H	H1
1	H	H2
1	H	H3
2	H	H4
2	H	H5
2	H	H6
3	H	H7
3	H	H8
3	H	H9
5	H	H10
5	H	H11
5	H	H12
8	H	H13
8	H	H14
8	H	H15
9	H	H16
9	H	H17
9	H	H18
10	HC	HC22
10	HC	HC23
10	HC	HC24
11	HC	HC25
11	HC	HC26
11	HC	HC27
12	HC	HC28
12	HC	HC29
12	HC	HC30
13	HC	HC31
13	HC	HC32
13	HC	HC33
14	HC	HC34
14	HC	HC35
14	HC	HC36
15	HC	HC37
15	HC	HC38
15	HC	HC39
16	C	C40
16	C	C41
16	C	C42
17	C	C43
17	C	C44
17	C	C45
18	C	C46
18	C	C47
18	C	C48
19	H	H19
19	H	H20
19	H	H21
20	C	C49
20	C	C50
20	C	C51
21	C	C52
21	C	C53
21	C	C54
22	U	U55
22	U	U56
22	U	U57
23	U	U58
23	U	U59
23	U	U60
24	U	U61
24	U	U62
24	U	U63
25	A	A64
25	A	A65
25	A	A66
26	A	A67
26	A	A68
26	A	A69
27	A	A70
27	A	A71
27	A	A72

Attachment N. Data Storage and Backup Sites

The following is presented in the Tahoe Regional Planning Association (TRPA) RFP In Field Records and Record Keeping Section:

- 1) Completion of the Pre-Field Checklist. A Checklist template shall be reviewed and approved by TKPOA/TRPA 15-days prior to the commencement of monitoring. These checklist forms should include, but are not limited to, the following:
 - a. Confirmation of coordination with TKPOA contact for access and staging of any equipment;
 - b. Names of personnel to perform the monitoring, and their completion of training and orientation;
 - c. Confirmation Field Data Sheet(s) are printed and ready for field; and
 - d. Confirmation all sampling equipment is ready for use.
 - **Pre-Field Checklist due within 24 hours of data collection**
- 2) Completion of the Field Data Collection Sheets (Field data sheet shall be reviewed and approved by TKPOA prior to the commencement of monitoring)
 - a. Date of field event
 - b. Test sites #s visited
 - c. Sampling site location identifier
 - d. Sampling type code and time of day for each sample
 - e. Name of field crew lead
 - f. Visual monitoring assessment
 - **Field Data Collection Sheets due within 72 hours of data collection**
- 2) Completion of the Control Methods Test Field Day Report:
bit.ly/cmtmonitoring
- **Control Methods Test Field Day Report due within 24 hours of data collection**
- 3) Completion of Chain of Custody (COC) forms: Chain of Custody (COC) forms, supplied by the outsourced analytical labs, will be filled out completely by listing sample identifications, desired analysis, number of bottles, and type of sample.
 - Requirements for COC forms:
COC forms for TKPOA record shall include, but are not limited to, the following requirements:
 1. Date and Time of Sampling
 2. Personnel responsible for collection of samples
 3. Sample Identification (to correspond to sample labels)
 4. Laboratories to analyze samples must be certified by the State Water Board, in accordance with the provision of Water Code Section 13176 and must include quality assurance/quality control (QA/QC) control data with their reports. Please refer to NPDES Permit, Attachment E, General

Monitoring Provisions, Section D for more details. Exhibit A.2.1 –
Herbicide and Rhodamine WT RFP Scope of Work March 9, 2022 Page
14 4. Parameters to be analyzed by lab

5. Preservatives utilized

6. Signatures identifying who is responsible for samples if they exchange
hands before going to the lab

7. Signature of lab acknowledging receipt of samples at correct
temperature and within appropriate timeframe (within 24 hrs of sampling
event). COC forms shall be uploaded to the appropriate folder on the
Project Dropbox as well as submitted to the following individuals via
email:

- TRPA Project Manager – Dennis Zabaglo (dzabaglo@trpa.gov)

- CMT Project Manager – Rick Lind (rick@sierraecos.com)

- CMT Assistant Project Manager – Rayann La France
(rlafrance@sierraecos.com)

- Water Quality Supervisor – Meghan Hoffman
(mhoffmann@tahoekeysPOA.org)

- CMT Monitoring/Technical Direction and Oversight Director – Dr. Lars
Anderson (lwanderson@ucdavis.edu)

- **Chain of Custody (COC) forms due within 72 hours of data collection**

Attachment O. Tentative Locations for Aerators in Herbicide and Combination Sites



Attachment P. Contractor Documents

Cultural Awareness Training

Cultural Awareness Brochure Review & Acknowledgment Form (please sign and return to Kirk Wooldridge (KWooldridge@tahoekeyspoa.org) and Rayann La France (rayann@sierraecos.com))

Submitting Datasheets

Please submit electronic copies of your company's completed data forms within the timeframe listed below to Rayann La France (rayann@sierraecos.com) and Aria Pauling (aria@sierraecos.com).

- Pre-Field Checklists within 24 hours of data collection
- Field Data Collection sheets within 72 hours of data collection
- Chain of Custody (COC) forms, if applicable, within 72 hours of data collection
- Lab Reports, if applicable, within 24 hours of receipt

Google Form

Additionally, please complete the Control Methods Test Field Day Report via Google Forms within 24 hours of data collection. Please contact Rayann La France if you have any questions or problems with the Google Form. Here is a short link to the Form for easy reference: bit.ly/cmtmonitoring

Dropbox

Please send a list of staff names and email addresses to Rayann La France that need access to the CMT Project Dropbox. All raw data, exported Excel spreadsheets, lab reports, COC forms, maps, photos, reports, etc. should be uploaded to the Dropbox folder within 72 hours of data collection.

Attachment Q CMT Years 2 and 3

1.0 INTRODUCTION: GROUP B METHODS

The CMT Year 2 and 3 implementation plans include the use of only “Group B”, non-herbicide management methods: Bottom Barriers, Diver Assisted Harvesting (DASH) and UV- Spot treatments, and the continued use of non-herbicide “Group A” methods: UV and Laminar Flow Aeration (LFA).

No herbicides and no Rhodamine WT (dye) were applied in Years 2 or 3. Therefore MMRP- specified monitoring for the following was not required in Year 2 or Year 3 of the CMT:

- a) Water samples and analysis for endothall or triclopyr or their degradants.
- b) Water sampling using Fluorometry for detection of Rhodamine WT dye (RWT). No RWT was used.
- c) Turbidity measurements during installation and removal of “double turbidity curtains” used for mitigating herbicide movement; curtains for the purpose were not used.
- d) Contingency Water sampling stations (related to RWT dye detections in Year 1)
- e) High-frequency sampling for Nutrients associated with sites where herbicides were applied in Year 1

The only herbicide-related monitoring is sediment sampling and analysis for Endothall in spring of 2024. These methods are described in the QAPP body.

2.0 MACROPHYTE SURVEYS (PHYSICAL RAKE SAMPLES)

Macrophyte sampling provides several metrics as a measure of aquatic plant responses to Group B Treatments including sampling within each CMT Site outside of specific Group B treatment areas:

- a) Rake fullness (a measure of overall abundance of all aquatic plants and algae)
- b) Species abundance (the relative amount of each species present on a single rake sample)
- c) Frequency of occurrence (in what percent of rake pulls does a species appear)
- d) Condition (plant health) (a rating scale: See QAPP Attachment x)
- e) Number of turions found on each rake sample
- f) Length of sprouted turions found on each rake sample.

Because the Group B treated areas are small relative to the CMT Sites in which they are used, macrophyte sampling intensity is adjusted (increased) within the Group B delineated polygons to provide representative AIP assessments. The number of rake samples is increased with increased Group B size, but shall at least include 6 samples randomly located rake pulls. The formula for number of rake samples may be adjusted based on size and shapes of Group B areas; however, the total number of rake samples in the CMT Site (including the Group B area within the associated site) should be kept at

least 30 but may increase to 40. This provides some latitude for adjustments to conditions. For Year 3, ESA will provide a standard method for determining the number of rake samples in each Group B area (e.g. fixed grid or random array) that will result in a consistently repeatable sampling method. The number of rake samples *outside* a Group B area but within the associated CMT Site will be adjusted to provide adequate representation of plant conditions, but no less than 15 and preferable 20-30, depending on the number of samples in Group B areas. Where no Group B Methods are used, a standard of 30 rake samples per survey event will be taken as in Year 1 and Year 2.

(The timing of macrophyte surveys is delineated for each type of Group B method below.)

3.0 GROUP B METHODS IMPLEMENTATION: YEAR 2 AND 3

3.1 Site Selection for Group B methods and locations

Results of Year 1 treatments assessed in fall 2022 and spring 2023 macrophyte surveys are used to determine what CMT treatments achieved 75% reduction in biovolume; physical rake surveys also provided assessment of the treatment effects on the species of AIP. Together, these data are used to select appropriated Group B areas within the CMT sites. The types of Group B treatments are assigned to Sites are chosen to provide replication of these methods and to represent similar AIP composition. A Group B methods location map will be constructed to show the specific Group B areas (polygons), sizes and types of treatments. The map will be updated as needed to accurately document Group B sites.

3.2 Bottom Barrier Implementation

Divers install three types of bottom barrier materials: 1) impermeable yellow “turbidity” curtains (Enviro USA); 2) gas-permeable “Lake Bottom Blanket” (Lake Weed Solutions); and (3) impermeable “BTL-20 Pond Liner” (20 mil thickness). All bottom barrier materials are cut to fit the selected areas and cut sections were combined as necessary with an overlap so that no gaps occurred which would allow AIP to establish. The turbidity curtain and “Pond Liner” materials are impermeable to gas whereas the commercial “Lake Bottom Blanket” material allowed transfers of gas with the water column. The decay of covered plants typically generates gases (for example CO₂, H₂S) and these gases can escape through the permeable material, but the impermeable turbidity curtains and “BTL-20” had to be “burped” (releasing gas) and in some instances, small openings were made in the impermeable barriers to allow gases to escape. Divers install the barriers and secured them in place with rebar and anchors. (Note that turbidity curtains that had been re-purposed for use as bottom barriers had heavy chains attached along one edge.) The corners of the barriers are georeferenced (GPS), and the NE corner is marked with an underwater label. The integrity of the barriers is checked bi-weekly and other monitoring crews report if abnormalities are observed. The Bottom Barrier locations, installation, removal dates, turbidity monitoring, and duration of cover are summarized in maps.

For Year 3, both non-permeable and gas permeable barrier materials may be used but it is recommended non-permeable material be used in the majority of sites since this type was found to be more easily anchored and do not require frequent maintenance in Year 2.

3.2.1 Monitoring Bottom Barrier Treatments

Macrophyte (Rake Sample) surveys will be made in the CMT Sites within 5 days before installation of Bottom Barriers (=Pre-Bottom Barrier conditions). Turbidity monitoring will be conducted during installation and removal of Bottom Barriers in accordance with MMRP.

Within 1 to 5 days after Bottom Barriers are removed, macrophyte (Rake Sample) surveys will be made with enough sample points to adequately represent the area that had been covered by a barrier, but no less than 6 samples. Macrophyte sampling will be continued at 14 day intervals after the first post-removals samples through November, weather permitting.

For Year 3, at least three Bottom Barrier installations will be monitored for dissolved oxygen (DO) and temperature using miniDOT loggers placed beneath the barriers when they are installed. The miniDOTs will be retrieved and downloaded when the Bottom Barriers are removed. Data from the miniDOTs will be summarized in both tabular and graphic formats and included in the CMT Annual Report for Year 3.

3.3 UV-C Spot Treatments

Two sizes of vessel-mounted UV light-array sizes are used: 8ft X 40 ft and 16 ft X 40 ft. The larger array vessel is used for center sections of UV Combination Sites 13, 14, 10, 11 and follow up (continued) Group A, UV-C Only Sites 22, 23, and 24; the smaller vessel array is used mainly for spot treatments and for nearshore-dock areas. Note: However, due to priorities for completion of UV-Spot treatments, Site 23 may be treated once with UV. On average, each site is treated between 15-30 minutes with physical overlap of the light array. The larger vessel (16ftx40ft) is used in mid channel areas and moved positions every 7.5 minutes with a 50% overlap. The smaller vessel (8ftx40ft) is used in the nearshore and changed positions every 10-15 minutes with overlap (Appendix F). The UV only and spot treatment sites usually receive four (4) half treatments throughout the season. Half treatments were 7.5 –15 minutes, with overlap. The combination sites were treated for 15-30 minutes with overlap. The variations in minutes of treatment is done to determine optimal and efficient UV exposures. Generally, the full-site (UV Only) treatments will require between 4 to 5 days; combination treatments make require 3 to 4 days and UV-C Spot treatments (Group B UV) require one half- to one day depending on the size. The Spot UV treatment areas are delineated by GPS-generated polygons so that re-treatments and monitoring for nutrients and macrophytes could be done in the correct locations. UV lamps are periodically checked for performance and cleaned as necessary to maintain desired output.

3.3.1 Macrophyte Monitoring UV Spot Treatments

Beginning 14 days after the start of the UV Spot treatments, macrophyte (Rake Sample) survey will be started and continued in the same sequence with each repeated Spot Treatment

As with rake sampling in Bottom Barriers areas, the number of rake samples may be adjusted based on the size of the area but must at least be 5 samples per area per sampling event.

3.3.2 Nutrient Sampling

The panel of nutrients analysis specified in the QAPP and MMRP will be measured from composite waters samples taken monthly in UV-Spot treated areas. The sampling methods are provided in the QAPP.

3.4 Diver Assisted Suction Harvesting (DASH)

The DASH method is used to remove and collect AIP from localized infestations. Maps for DASH sites are provided to the dive team and monitoring crews to insure correct locations for repeat DASH treatments. The dive crew also typically uses shoreline (docks) landmarks and GPS to confirm AIP removal boundaries. Suction-assisted hand harvesting is done with a pumped-venturi, suction generating flow system so that divers can direct hand-pulled plant material into the end of the suction tube that deposits the plants into a fine mesh (3 mm pore) “sock” retained in a receiving box at the water surface. The “sock” captures plant material and allowed water to pass through. Once the “sock” (mesh bag) is filled to its capacity, the contents are transferred to 40-gallon plastic pails and weighed. During a DASH event, separate sub-samples of the removed plants are saved in 5-gallon pails for drying to later count the amount of turions removed. During the DASH operations, a topside crew member uses a hand-held screen net (3 mm pore) to remove floating surface fragments generated by divers’ actions. Divers could usually finish clearing a 2,000-2,500 sq ft area within a day.

3.4.1 Turbidity Monitoring During DASH

Turbidity measurements will be made near (within 25 ft) of the diver activity before and during DASH activity. If turbidity exceeds 10% of “pre” conditions, DASH will be paused until turbidity is within 10% of “Pre-DASH” conditions. The turbidity equipment and measurement methods are described in the QAPP.

4.0 LFA MONITORING YEAR 3

4.1 Nutrients

The nutrient panel specified for CMT water samples will be analyzed from water samples take monthly in the LFA Sites (Sites 25,26,27). This is an increase from Year 1 and Year

2 in which nutrients were only sampled twice each year. The sample collection methods for nutrients in CMT sites are described in the QAPP.

4.2 Macrophyte Surveys

LFA Sites will be surveyed monthly using physical rake samples. Thirty samples in each LFA site will be taken so that both nearshore and mid-(deep) water areas are adequately represented. However, in Group B Methods Areas within LFA Sites, the numbers of rake samples will be adjusted (generally increased) to provide sufficient assessment of plant conditions and species abundance. For Year 3, ESA will provide a standard method for determining the number of rake samples in each Group B area (e.g. fixed grid or random array) that will result in a consistently repeatable sampling method. The number of rake samples *outside and inside* a Group B area but within the associated CMT Site will be adjusted to provide adequate representation of plant conditions, but no less than 15 and preferable 20-30, depending on the number of samples in Group B areas. Where no Group B Methods are used, a standard of 30 rake samples per survey event will be taken as in Year 1 and Year 2. For Year 3, the number of Curlyleaf Pondweed turions and lengths of sprouted turions in each rake sample shall be recorded and uploaded to ‘shiny app’. Species that have flowers are noted in the field forms and then included on the “shiny” app.

4.3 “Muck” Layer Assessment

LFA is designed with the intent of reducing the organic layers accumulated at the bottom of the Keys lagoons. Since the amount of “Muck” is highly variable, in Year 2 and Year 3 fine mesh bags were sealed with known amount of muck and bags were anchored near the bottom of LFA sites and in Control Site 16. The details of deployment are provided in the main body of the Annual Report for 2023. In spring and fall, on mesh bag from three FLA site and one control will be carefully removed. Staff removing and handling the bags and muck will wear “surgical” type gloves so that external contamination with other soils or plants will be prevented. The contents will be photographed, weighed and sent to a certified laboratory for analysis of % organic matter, total N, total P, Ortho P, Nitrate+Nitrite, and ammonia. The normal COC documentation for the muck bag samples will be documented. Muck samples are kept in the refrigerator in the dark before shipping to the laboratory but should be received by the laboratory no later than 3 days after collection.

4.4 “Muck” Layer Measurements with Staff Gage and Fixed Metal Targets

The methods for these measurements are described in the Annual Report – Year 2.

5.0 SEDIMENT ANALYSIS FOR ENDOTHALL AND ENDOTHALL DEGRADANTS

During spring 2024, sediment samples will be taken from sites in which Endothall was applied in 2022. Retrieved sediments will be shipped to a certified laboratory for analysis of Endothall and its degradants per protocols used for similar samples taken in 2022.

Contractors for TRPA will obtain the samples and ship samples for laboratory analysis. All standard COC documentation will be maintained.

6.0 PHOTOGRAPHIC RECORDING (YEAR 3) TO DOCUMENT CMT TREATMENT EFFECTS ON MACROPHYTES

6.1 Purpose

In addition to bi-weekly (14-day interval) rake sampling and bi-weekly hydroacoustic scans, underwater photographic images (still and/or video) of plant conditions may be useful in assessing Group B and follow-up Group A treatments in Year 3. The ability to obtain still images or video recordings depends on water clarity (turbidity) and the methods described below may not provide useful images in some instances. If visibility is less than 2 feet, the images may be of limited value; however images may be recorded at the discretion of the field staff when visibility is low.

6.2 Equipment and Methods

6.2.1 Camera

The recommended camera is a GoPro (recent model 2020 or newer) that is capable of use in submersed conditions and can record either still or video imaging.

The GoPro may be handheld by divers or attached to a vertical pole device that securely fixes the position of the camera. Regardless of the method, the distance from the bottom to the GoPro lens should be measured and kept as consistent as possible.

6.2.2 Use of fixed-pole mounted GoPro

A pole-mount device should be capable of consistent orientation and positioning of the GoPro: The camera lens is aimed directly at the bottom and the distance from the bottom to camera mount must be fixed and constant. An example is shown in the figure below (Figure Q-1).

6.2.3 Estimating the Area (sq ft) of the Fixed or Video Image

In order to compare different sites and photographic locations, the area of the image must be known. The area can be determined by measuring the dimensions of the image captured by the GoPro. This can be done by positioning the pole-mounted GoPro at its fixed distance above a flat surface and placing a ruled tape to cover the “field of view”. (Typically, this may be approximately from 36in. by 52 in. for a camera height of 36 inches.) Note that the size (area) of view depends on the GoPro setting (e.g., “narrow” vs. “wide” view). The narrow option is recommended.

6.2.4 Calibration of GoPro Image

The setting used on the GoPro (narrow, wide) is recorded in the field log. Before images are taken, the actual size of the field of view is measured (6.2.3) and recorded. The measurement is checked at the beginning of photography for each site.

6.2.5 Labeling and Documenting Images (Still and Video).

Before an image is taken, a “whiteboard” (at least 12 in. square) is labeled and recorded by the GoPro:

Date, Site number; photo image number (this can be a code or sequential), time.

These data are also recorded in a field log notebook and uploaded to the CMT Year 3 Dropbox within 48 hours after photography is completed for a site.

6.2.6 Number of images and locations

- a. Group A Sites including Controls: At least 6 images are taken (three mid-channel; three shoreline) for each site.
- b. Group B areas: At least 3 images are taken INSIDE the group B area (in the same Site) and at least 3 images are taken OUTSIDE the group B area.
- c. Frequency and timing of imaging. For Group A sites and LFA sites: once per month (June through October)

For Group B area: The following sequence:

- a. DASH: 3 to 7 DAT. (repeat after repeated DASH)
- b. UV-Spot: 10 to 12 DAT (repeat after each repeated Spot UV treatment)
- c. BB post removals: 14 DAT; repeat 28 DAT (optional depending on weather)

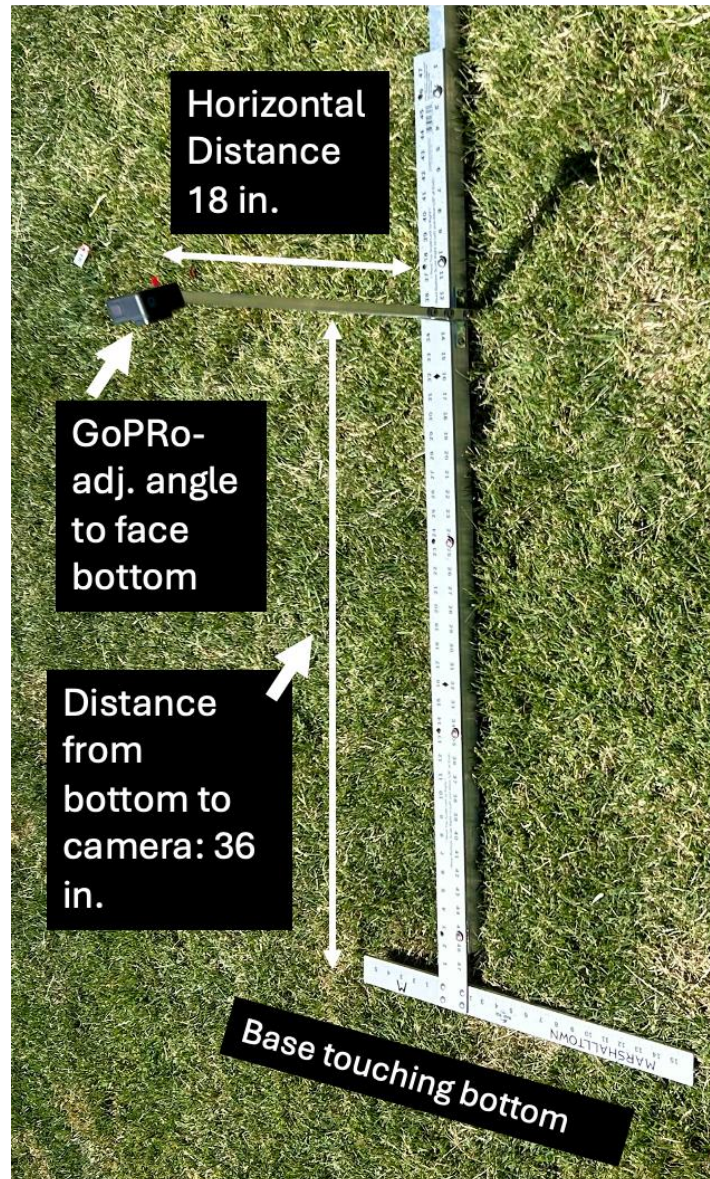


Figure Q-1. Example of pole-mounted GoPro camera used to produce consistent image sizes (area). Note: The height of the GoPro to the bottom may be varied to adjust to water clarity (e.g., 18 inches instead of 35 inches), but this will change the image dimension which must be measured before imagery is taken.