submittal cover for
SWPPP, and ESCP 2

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) and Erosion Soil Control Plan (ESCP)

Chelan River Project
Chelan, WA

Bid No.: 08-01

PUD No. 1 of Chelan County

May 27, 2008

Table of Contents

PROJECT OVERVIEW

1.1 Project Description

The Chelan River Project entails construction of the Chelan tailrace pump station conveyance canal and outlet structure between the tailrace of the powerhouse and the upstream end of Reach 4. The other major component of the project is the tie in and installation of eighty four inch welded steel pipe from the existing bulkhead to a new outlet control structure at Chelan Dam.

Work that is part of this contract includes the installation of five owner furnished submersible pumps to be placed at the pump station, which is located to the southeast of the existing powerhouse. A 1000 foot long shotcrete lined conveyance canal will feed water into the upstream end of the Reach 4 Habitat Stream which is approximately 2300 feet long. A fill of close to 27,000 cubic yards will be placed in the existing powerhouse tailrace to create two acres of new spawning grounds. The project also involves construction of the Low Level Outlet structure located at the Chelan Dam the 250 feet of pipe that runs from the dam to the outlet structure.

1.2 Pollution Prevention

All work at the Low Level Outlet area and at Reach 4 will be conducted by Goodfellow Bros., Inc. as to most efficiently minimize water and air pollution. The major issues related to water pollution include turbidity levels, suspended sediment in the water, total settleable solids, oil, grease and pH levels. Any work that involves the presence of lead will be handled in accordance with WAC 296-155.

All necessary measures will be implemented to make sure air pollution is minimized. There will be water trucks on site when dust becomes an issue. Rock check dams, silt fence, silt curtains, and all standard TESCP methods will be used based on individual situations. Spill and contamination kits along with other clean up supplies will be kept at both job locations. All information on spills and water quality can be found in the WQPP.

During construction, especially in Reach 4, efforts will be taken to minimize harm done to existing vegetation and wetland areas. Roads will be constructed so as to minimize detrimental effects to the existing wildlife/plant life and to most efficiently construct the fish channelization.

All brush and construction debris will be stockpiled on land so it does not enter any state waters. Stock piles of material will be in designated areas so as to minimize vehicle and equipment travel, thus causing less negative impacts to the land. Any fill to be placed in the habitat channel or the tailrace section of the river will be free of toxic materials as this will be native material excavated from the habitat channel. If any contaminated material is encountered it will be dealt with in accordance with the WQPP. Any rain that occurs during the project duration that results in runoff from adjacent, undisturbed areas will be diverted via perimeter ditching around the work zones to these areas. The natural vegetation will act as a filter, as it has done prior to construction, to reduce sediment from entering the waterway.

1.3 Turbidity Standards

Turbidity standards for storm water and discharge during construction will be kept in accordance with Class A water regulations and also remain consistent with WAC 173-201A-200. The temporary turbidity mixing zones shall follow the regulations established for the Chelan River Project Erosion and Sediment Control Plan seen below:

a. For waters up to 10 cfs flow at the time of construction, the point of compliance shall be 100 feet downstream from activity causing the turbidity to exceed its limit.

b. For waters above 10 cfs up to 100 cfs flow at the time of construction, the point of compliance shall be 200 feet downstream from activity causing the turbidity exceedance.
c. For waters above 100 cfs flow at the time of construction, the point of compliance shall be 300 feet downstream from activity causing construction work in flowing water will not be subject to turbidity standards and will be scheduled with Ecology.

1.4 Hydraulic Project Approval

Goodfellow Bros., Inc. will incorporate pollution control measures as detailed in the Water Quality Protection Plan during construction of the Chelan River Project. Fish agencies including NMFS, USFWS and WDFW will review all construction activities with the potential to impact fish and fish habitat if required by contract.

1.5 Monitoring and Sampling Plan

A minimum of two water samples located 100 feet up stream of where any in water work is taking place will be done each day. At the same time compliance samples will be taken at a distance specified from the in water work on the downstream side of the work and will be checked against the turbidity standards shown above in section 1.3. All information gathered during monitoring and sampling including any permits or Goodfellow Bros., Inc. work plans will be kept on site and available to the DOE for review. Sampling will take place at the hours of 10:00 AM and 3:00 PM and recorded for compliance. Additional sampling will occur on an as needed basis as work conditions change or visual inspections necessitate in order to assure turbidity levels are within the WAC requirements. Monitoring will take place using a HACH 2100P Turbid Meter. There will be 2 monitors on site and one will be located in the superintendent's truck in order for random monitoring to take place throughout the day which may occur as frequently as each hour or more as conditions dictate. Random monitoring will be recorded and measured against background samples in order to be sure NTU readings stay within acceptable levels. The background samples will be taken at the powerhouse discharge area along the left bank upstream of the pump station work area for work within the tailrace and at the right bank at approximately station 25+00 at the upper north end of the habitat channel for work within Reach 4. Compliance samples will be taken in accordance with WAC 173-201A-200 (1)(e)(i) and/or at the downstream side of the railroad bridge along the right bank of the Columbia River as shown on attachment C. As conditions change we will consult the Chelan County PUD and Department of Ecology in order to implement any necessary changes to the monitoring and/or reporting plan.

Along with turbidity monitoring, Goodfellow Bros., Inc. will test for dissolved oxygen once daily adjacent to the work area. Dissolved oxygen must remain above 8 mg/l. The dissolved oxygen level will be recorded daily for record and this reading will be taken at 10:00 AM as turbidity monitoring takes place.

1.6 BMP's for NMFS

a. A minimal footprint area will be used to successfully complete the Chelan River Project
b. Any alteration to the existing stream bank and vegetation will be minimized.
c. No herbicides will be applied throughout the course of the job
d. All vegetation within 150 feet of the edge of the bank will be retained so as to preserve the plant life and minimize any natural water runoff, to the maximum extent possible
e. All in water work will be in accordance with both figure 1 of appendix 1, and the standards set forth by NMFS, the State of Washington and the Corps of Engineers.

f. Work will stop and equipment and materials will be relocated in case of an emergency high water situation or during emergency spills in the Chelan River Channel.
g. All intakes on the project will have fish protective screens. Any in water work where fish could get trapped will be checked prior to work proceeding.
h. We will provide fish passage to adult or juvenile salmon during construction as necessary.
i. Any work in the habitat channel will meet BMP's for erosion control.

1.7 Erosion Control Plan

Goodfellow Bros., Inc. will use all BMP's listed above to minimize erosion throughout the construction of the Chelan River Project. Pollution prevention will be in accordance with state and Federal law as shown above in section 1.2. The north and east side of the project will be protected via silt fence as shown in the contract documents along with standard erosion practices. The biggest threat of runoff is due to the steep slope and minimal vegetation on the hillside in the Reach 4 area which will be undisturbed by our work. Special care will be taken when constructing the stream crossing and pump station pad to minimize turbidity levels. Special erosion prevention will also be associated with the drilling sites, borrow pit operations, haul roads, material storage sites and staging areas. The work area at the pump station will be enclosed using silt curtains installed in the river in an effort to contain as much turbid water as feasible within the work zone (see appendix C for materials information). Monitoring of water quality will take place in accordance with section 1.5. Should the NTU readings become out of compliance, work will be slowed or stopped or other BMP measures will be put in place in order to regain compliance and keep turbidity levels to minimum. The existing project site consists mainly of small boulders, washed rock and sand particles. Most of the rock on site is all "clean" river rock. There is some silt as shown in the boring logs that will be watered using a water truck if dust becomes an issue.

At the Low Level Outlet work area, the erosion focus will be to prevent runoff from reaching the Chelan River. A water truck or dust pallative will be placed on the dam access road to minimize air pollution if it becomes a problem. The potential for erosion damage at this site is low as the areas of disturbance are minimal and able to be contained within the required excavations. The area will be monitored and measures will be implemented as needed. Rainfall during the months of June, July, August and September are the lowest levels of the year. However, localized storm events are possible and there will be BMP materials deployed or installed should any such event occur. These materials will include plastic sheeting for covering stockpiles, silt fence materials and areas of work will be stabilized with hydroseeding or final surfacing as required upon completion.

The site is mostly undeveloped other than the County Park and existing powerhouse on the south and west sides of the project. Therefore, there are no established drainage facilities. Any runoff from existing surfaces at the present time runs along the surface until finding a path to enter the river or other bank side channels or dissipates into the native soil.

1.7.1 Overall Erosion Potential Assessment

SWPPP Responsibilities

The responsibilities for implementing the SWPP plan are outlined in Table 1 below. The personnel listed are capable of providing information within their area of expertise.

Table 1.1 SWPPP Responsibilities

Affiliation	**Title**	**Name**	**Phone No.**	**Responsibilities**
Goodfellow Bros.	Project Manager	Ron Jordan	509 669 4456	Overall project management and other company duties.
Goodfellow Bros.	Superintendant	Bob O'Connor	206 793 1947	Runs field activities of the job
Goodfellow Bros.	Project Engineer	Trevor Ottmer	206.396 6773	Assists project manager
Goodfellow Bros.	Foreman	Doug Smith	425 766 2341	
Chelan PUD	Project Manager	Scott Tidd	509 661 4050 509 860 9792	Project Manager for Chelan County
Chelan PUD	Project Manager	Vern Chamberlain	253.966.4369	Project Manager for Chelan County

1.7.2 Storm Water Pollution Prevention Plan Minimum Requirements

This storm water pollution prevention plan (SWPPP) is designed to establish when, where and how specific best management practices (BMPs) will be implemented to prevent erosion and the transport of sediment from the construction site. Due to the unpredictable nature of weather and construction conditions, the SWPPP is a "living document" and is subject to modifications to successfully prevent erosion throughout construction. These modifications will be made with the consultation of the Chelan County PUD and the Washington Department of Ecology.

Should field conditions during construction require additional BMPs or changes to the temporary BMPs, this plan shall be modified jointly by the Chelan County PUD and Goodfellow Bros., Inc. During active work, the contractor shall keep the SWPPP and BMP inspection report on site. In addition, Chelan PUD shall coordinate with DOE in the event any changes to the BMP's become necessary.

1.7.3 Minimum Requirements

In order to prevent erosion and the transport of sediments from the site, this plan will include the thirteen minimum requirements for erosion control plans required by the State of Washington. Items used to protect the site will remain in place beyond the completion of construction activities until the Department of Ecology determines that the site is stable. The minimum requirements are as follows:

- Requirement #1 – Stabilization and sediment trapping
- Requirement #2 – Delineate clearing and easement limits
- Requirement #3 – Protection of adjacent properties
- Requirement #4 – Timing and stabilization of sediment trapping measures
- Requirement #5 – Cut and fill slopes
- Requirement #6 – Controlling off-site erosion
- Requirement #7 – Stabilization of temp. conveyance channels and outlets
- Requirement #8 – Storm drain protection
- Requirement #9 – Underground utility construction
- Requirement #10 – Construction access routes
- Requirement #11 – Removal of temporary BMPs
- Requirement #12 – Dewatering construction sites
- Requirement #13 – Maintenance

All of the minimum requirements, if applicable, are addressed using standard BMPs. The BMPs are described in detail in other documents. The BMP numerical listings preceded by an "E" (e.g., BMP E1.10) are from the Highway Runoff Manual, and the BMP numerical listings preceded by a "C" (e.g., BMP C230) are from Washington State Department of Ecology Stormwater Management Manual for Central Washington.

1.7.4 Requirement #1 – Stabilization and Sediment Trapping

Methods of stabilizing slopes within the work areas for this project may include the following:

- Mulching and/or matting
- Plastic covering
- Rip rap placement and protection

Areas where sediment trapping is deemed necessary may include the use of the following devices:

- Filter Fence

- Straw Bale Barrier
- Gravel Filter Berm
- Temporary Sediment Pond
- Level Spreader
- Construction Stormwater Filtration

1.7.5 Delineating Clearing and Easement Limits

Existing vegetation in areas outside the work zones shall be preserved when removal is not necessary for the construction of the project. The contractor must survey, stake and flag clearing limits shown in the plans and/or areas not to be disturbed before any clearing or grubbing can begin. BMPs to be used for in and around the described areas include the following:

- Preserving natural vegetation
- Buffer Zones

1.7.6 Protection of Adjacent Properties

Properties adjacent to the project work zones will be protected from erosion and sediment deposition by using standard BMPs to protect the areas. Silt fence and silt curtains will be used to prevent sediment runoff as well as ditching and other methods of guiding runoff to specific controllable areas within the work zones.

1.7.7 Timing and Stabilization of Sediment Trapping Measures

Sediment ponds and traps, perimeter dikes, sediment barriers, and other BMPs intended to trap sediment on site shall be installed and functional as a first step of construction prior to any other land disturbing activities. Slopes will be stabilized through either walking of the slopes with a dozer or other track typed machine, or mulch coverings will be placed if deemed necessary to stabilize the slopes of temporary ponds.

1.7.8 Cut and Fill Slopes

The cut and fill slopes within the work zones of this project will be protected with typical BMPs. Examples of how the cut and fill slopes will be protected are as follows: the cut and fill areas may include terracing of the areas to reduce runoff flow rates, any roads accessing the work zones will be sloped to allow the handling of runoff to be collected in temporary sediment ponds, ditches or culverts will be established to divert runoff to areas that would allow the proper handling of the water. All slopes will be stabilized with rip rap materials upon completion in order to protect them from erosion.

The majority of this project will be occurring during the driest months of the year. Due to the possibility of a major event, the contractor will be prepared to cover cut and fill slopes with proper BMPs to restrict any runoff during rain events or the normal course of construction. The work zones are fairly small and are readily manageable. Once slopes have reached final grade they will be track walked and the final landscaping, if any, will commence.

Some of the following BMPs will be used to protect the cut and fill slopes associated with this project:

- Surface Roughening
- Terraces
- Interceptor Dikes and Swales
- Silt Fences

1.7.9 Controlling Off-Site Erosion

Properties and waterways downstream from the project site shall be protected from erosion by preventing increases in volume, velocity and peak flow rates and abiding with the Joint Aquatic Resources Permit Application (JARPA) and the Nationwide Permit (NWP) 7 and 27. Increases in storm water volumes will be minimized by preserving vegetation, track walking exposed slopes and by methods of covering slopes when necessary.

BMPs that will be used to prevent offsite erosion include the following:

- Preserving vegetation
- Buffer zone
- Sediment traps
- Swales or ditches
- Surface roughening
- Silt Fence
- Silt Curtains

1.7.10 Stabilization of Temporary and Permanent Conveyance Channels and Outlets

All temporary and permanent conveyance channels and outfalls shall be stabilized to prevent erosion and reduce sediment transport from the site. Channels will be maintained as necessary to allow flows of water. If it is found to be necessary, based on the amount of fine materials that exist in the flow channels, the channels will be lined with rock in an effort to reduce the amount of soil transportation and keep turbidity levels at an acceptable level. If it becomes apparent that water flow velocity must be reduced, the use of rock check dams will be utilized within smaller and manageable channels.

Typical BMPs to be utilized include the following:

- Riprap channel lining
- Check dam
- Permanent seeding and planting
- Mulching and matting
- Outlet protection

1.7.11 Storm Drain Inlet Protection

Not on site.

1.7.12 Underground Utility Construction

No more than 500 feet of trench shall be opened at one time. Where consistent with safety and space considerations, excavated material shall be placed on the uphill side of the trench. Any material stockpiles will be surrounded by silt fence and covered with plastic to prevent runoff.

1.7.13 Construction Access Routes

Tracking of sediment onto paved roads will be minimized. All traffic on and off of the site will be restricted to stabilized construction entrances. Traffic within the site will also be limited to stabilized construction roads. If any sediment is transported onto a road surface, the road will be cleaned thoroughly at the end of each day.

The following BMPs may be used:

- Stabilized construction entrance
- Construction road stabilization
- Wheel wash
- Road sweeping by vacuum truck

1.7.14 Removal of Temporary BMPs

All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or when the engineer of record determines that the temporary BMP is no longer needed. The Department of Ecology will be notified prior to changes taking place. Trapped sediment shall be removed or stabilized on site. Disturbed soil areas resulting from removal shall be permanently stabilized.

1.7.15 Dewatering Construction Sites

Discharge water will be at 5 NTU or less than that of background and will be discharged into the existing waterway. Any water to be dewatered that contains a visible "sheen" from petroleum will be discharged to a pond and treated prior to release.

Turbid or extremely turbid dewatering water will be conveyed to a settling pond, pumped to an area near the large staging area and allowed to aerate out into the surrounding areas using spray bars. The water will gradually seep into the ground and naturally dissipate.

The following BMPs may be used:

- Check dam
- Sediment trap
- Temporary sediment pond

1.7.16 Maintenance

All temporary and permanent erosion control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. The erosion control lead will inspect all BMPs weekly and daily during rain events. Maintenance activities will be completed within 24 hours of the inspection. An inspection and maintenance report will be prepared following each inspection.

The erosion control lead will visually check site discharge during each inspection. If any turbid discharges are observed, the engineer will be notified immediately and corrective action will be prescribed. Whenever a site inspection reveals that a BMP is inadequate to prevent erosion or sediment discharge, the Contractor and the Chelan County PUD shall jointly modify the plan and notify Eclolgy of the BMP failure and modification.

1.8 Schedule

1) Prior to the start of any work, the contractor will verify the following:
    - Determine at which point concentrated site runoff would leave the project site.
    - Locations for testing of turbidity both upstream and downstream of the work areas.
        - These areas are shown on the attached map of the project.
    - Clearing limits.

2) Prior to any soil disturbing activities the contractor shall install:

- Perimeter control BMPs
- Diversion measures

3) Prior to any grading activities, a temporary diversion will be established to redirect water away from the upper end of the habitat channel and a temporary bridge access will be installed.

4) Only after the appropriate BMPs have been installed will construction activities begin.

5) Additional erosion and sedimentation control facilities will be added if monitoring or inspections show a risk for water quality violations.

6) BMPs will be maintained as necessary.

7) Replace temporary BMPs with permanent BMPs as construction allows and the contract requires.

8) Once all permanent construction is complete, remove temporary BMPs within 30 days.

1.9 Pollution and Discharge Water

Excess concrete will be contained and not placed within 150 feet of the water unless otherwise required section 02467 of the contract. Temporary wash out facilities will be provided at locations determined by GBI and the owner. No cement or chemical agent will enter the soil and visqeen sheeting or some other impervious material will be used in the washout areas. If construction water is contaminated it will be collected and/or treated before being removed off site. Construction Discharge water will not be released within 300 feet upstream of a spawning areas. Debris, vegetation and other solids will be stockpiled on site and then removed when appropriate. No sewage, waste spoils, or petroleum products will contact wetlands or water below the "high-high water elevation or 10- year flood elevation, whichever is greater." Treated wood will not be used on the site.

An MSDS book will be provided at the job site containing descriptions of hazardous materials used on the project. Flammable items will be either located in a non combustible can or in a safety connex. In addition to the TESC that is implemented at the beginning of the project Goodfellow Bros., Inc. will have erosion control supplies on site including, but not limited to, rolls of visqueen, straw bales, geo-fabrics, silt curtains and silt fence at the site ahead of the construction task requiring the erosion control.

2.0 Preconstruction Activity

Before construction proceeds, clearing limits and construction limits will be established. Any required construction fencing will also be installed as required. Emergency and temporary erosion controls will also be set up and on site. The first major phase of the project will include grading of the Chelan River north and east of the future conveyance canal. This section of the channel will handle any spill water from the Chelan Dam and accommodate a future temporary bridge. Since this is a section of the river that receives spill water every year, all the rock is very clean. There is most likely a layer of sand beneath the rock that will also be excavated. The sand is coarser than the silts and therefore will "fall" to the bottom of the river and minimize any cause any sort of plume or dust in the water or in the air. Since most of the excavation is clean rock and sand, environmental impacts will be minimized. Rip rap will be strategically placed along the toe of various banks to minimize erosion as well. Berms will be constructed downstream of the work in order to contain any ground water disturbance within the work zone.

2.1 Temporary Access Roads

a. Roads will have grades less than 30 percent.
b. Equipment will be kept out of the water unless the work otherwise requires this.
c. Access roads and stream crossings will be built to access as much of the project as possible, with the fewest possible number of roads
d. Stream crossings will be built with recognition of where spawning areas are located. The construction of the stream crossings will be designed with regards to the HPA and the flow of the Chelan River at various times throughout the year. Access roads will be removed at the end of the project. Revegetation will take place as shown in the contract drawings.

2.2 Equipment Cleaning, Wash Out Areas and Sediment Ponds

Equipment selected for this project was considered because of its production, on site utilization and mobility throughout the work site. Staging, cleaning and maintenance of all vehicles will be at a designated distance from waters' edge as conditions dictate. Equipment and vehicle documentation is recorded by the oilers/fuelers, mechanics and shop personnel. Any equipment entering the water for purposes of construction will be cleaned by pressure washing or other means necessary to remove oil, grease and other contaminants prior to in water work.

All construction equipment used on the Chelan River Project at either the Reach 4 location, or at the Low Level Outlet will be cleaned prior to arriving on site. It will be cleaned at our Wenatchee based shop, or through the equipment rental store. Therefore no degreasing area will be shown on the drawings. "Stabilized Construction Entrances" will be set up at each location as shown on the attached plans. Goodfellow Bros., Inc. will attempt to take all the standard cleaning and erosion measures necessary in order to avoid tracking any fuel, oil, grease, debris or soil off the site, and onto the highway or nearby surrounding areas. The amount of material brought off site will be limited because of cohesionless soil and our equipment will rarely be in the water. For both Reach 4 and the Low Level Outlet, there is only one way to arrive and leave each job location, resulting in the entrance and exit being at the same place. All equipment onsite will be maintained daily. Any excess oil or grease will be cleaned up immediately with absorbent pads or other cleaning devices designed for such needs. The equipment will be removed from the river's edge prior to lubing, servicing or fueling.

Equipment that is leaving the site will be leaving the site will be cleaned of loose dirt only. No pressure washing or other method of washing will be done to the equipment before leaving the site. If it is necessary to wash the equipment, it will done offsite at an appropriate location.

2.3 Site Preparation

Goodfellow Bros., Inc. will only be moving on site native materials as it is necessary to parts of the construction process. If a large quantity of material is moved, it will be stockpiled in a location that is out of our way but not detrimental to the environment unless otherwise being used as embankment material.

As of this time, Goodfellow Bros., Inc. does not have the construction of any dikes planned at either of the two job locations. Three foot rip rap will armor the east edge of the existing dike in Reach 4 and will be located to either side and possibly beneath the temporary bridge. There will be a temporary lined wash out in the stockpile area at the Low Level Outlet. There will also be one in Reach 4 slightly to the east of where the future channel is to be built located near the center of the site. There will be a temporary sediment pond located to the southeast of where the five submersible pumps are to be placed. Potential screening locations are also shown on the attached map, with the primary location most likely being the designated borrow area.

2.4 Earthwork

Material excavated will be used for fish mix, riffle mix or other fill upstream in the fish habitat channel when possible. Most of the rock excavation on site will be used as fill to raise the tailrace channel area on the south end of the project to the required elevations and create new spawning grounds.

3.0 References

Washington State Department of Transportation, Highway Runoff Manual. August 2000.

Washington State Dept. of Ecology, Stormwater Management Manual for Western Washington. August 2000.

Appendix B
Sample Monitoring and Maintenance Inspection Sheet

Sample TESC
Monitoring and Maint

Appendix C
Silt Curtain Material Data and Installation Procedures

0801-GOOD-S-comm
ercialproductssiltcurta

Appendix D **Map and legend showing the locations of BMP's, Staging, Fueling, Channel Locations, Oil Absorbant Boom Locations, Etc.**

Mobilization and
Staging Map.pdf

Map Legend.docx

Appendix B:

Sample TESC Monitoring and Maintenance Inspection Sheet

Inspector(s):_____ Date:_____

Site Name and Location:_____

Current Weather Conditions:_____ Last 24 Hours:_____

BMP Designation	O.K.	Not O.K.	BMP Condition, Corrective Action, General Notes
Soil Stabilization			
Perimeter Control			
Construction access			
Stability of Conveyances			
Water Management			
Inlet protection			
Outlet Protection			
Stormwater Detention			
Dust control			
Site Discharge			
Receiving waters			

Bill Moffat Sales, LLC Custom Manufacturers Representatives
Industrial Environmental Fabric Products

7621 220th S.W.
Edmonds, WA. 98026

Toll Free: (877) 752 9132
Telephone: (425) 672 9690
Fax: (425) 775 7082
Cell: (206) 790 9648
e-mail: bmoffat7@msn.com

Ron Jordan
Goodfellow Bros.,

202.2 lbs/ft total May 2008

Here is our quote for the curtain that meets all of your silt curtain requirements and specifications.

Bill of materials:

1. Flotation – 8" x 8" x 6' Marine grade EPS – 21.48 lbs/ft lift capacity
2. Flotation cover –3522 PVC Bright Yellow – data sheet enclosed
3. Silt/turbidity curtain fabric –1199 Monofilament polypropylene- data sheet enclosed or 3522 PVC coated polyester
4. Tension point reinforcement – 5,000 lbs webbing –
5. Chain ballast – Proof coil galvanized chain – 2 each 5/16" 1.1 lbs/ft each 2.2 lbs/ft total
6. Section connectors – flotation. HD webbing with #4 spur grommets or
   ASTM Universal slide aluminum 24" a $90 option per set
   Curtains HD webbing with #4 spur grommets
   Set up for rope lacing or wire ties

Manufacturing procedure:

1. Welded seams: Membranes - microwave bar welding – Curtain- rotary hot air
2. Foam flotation: machine cut to 6' length and bullnosed for easy folding
3. Sewn items- industrial sewing machines and 150 lbs tensile threads
4. Penetrations – all penetrations are grommeted with #4 Spur grommets

Packaging:

1. 100 foot sections folded back on each other at 6' fold points.
2. Silt curtain will be collected under foam and tied so that as the curtain is placed simply cut the tie straps and it will sink to the 30' depth.

Please contact me with any questions you might have. I will be available to answer them and provided you with material submittals or other data.

Goodfellow Bros.

Ron Jordan or Trevor

Pricing and weights per unit as described as described above:

Section #1 and size

#1	8" foam flotation x 5' skirt depth x 116' lengths (3 each)	@	$12.75 per ft
#2	8" foam flotation x 15' skirt depth x 116' lengths (3 each)	@	$17.25 per ft
#3	8" foam flotation x 20' skirt depth x 116' lengths (3 each)	@	$19.75 per ft
#4	8" foam flotation x 25' skirt depth x 116' lengths (3 each)	@	$21.96 per ft

Typical weights:	Section #1	100 lbs
	Section #2	265 lbs
	Section #3	360 lbs
	Section #4	465 lbs

BILL MOFFAT SALES
Cell: 206 790 9648
Toll Free 877 752 9132
Tel: 425 672 9690 541 923 5336
Fax: 425 775 7082 541 923 3574
e-mail: bmoffat7@msn.com

US Army Corps of Engineers

Best Management Practice #27: TURBIDITY CURTAIN

Definition

A floating geotextile material which minimizes sediment transport from a disturbed area adjacent to or within a body of water.

Purpose

To provide sedimentation protection for a watercourse from up-slope land disturbance or from dredging or filling within the watercourse.

Conditions Where Practice Applies

Planning Considerations

Soil loss into a watercourse results in long-term suspension of sediment. In time, the suspended sediment may travel large distances and affect wide-spread areas.
A turbidity curtain is designed to deflect and contain sediment within a limited area and provide enough residence time so that soil particles will fall out of suspension and not travel to other areas.

Turbidity curtain types must be selected based on the flow conditions within the water body – whether it is a flowing channel, lake, pond or a tidal watercourse. The specifications contained within this practice pertain to minimal and moderate flow conditions where the velocity of flow may reach 1.5 meters per second (5 feet per second), or a current of approximately 6 kilometers per hour (3 knots). For situations where there are greater flow velocities or currents, a qualified engineer and product manufacturer should be consulted.

Consideration must be given to the direction of water movement in channel flow situations. Turbidity curtains are not designed to act as water impoundment dams and cannot be expected to stop the flow of a significant volume of water. They are designed and installed to trap sediment, not to halt the movement of the water itself. In most situations, turbidity curtains should not be installed across channel flows.

ProPex®
geotextiles

1198

ProPex 1198 is a polypropylene woven fabric. This engineered geotextile is stabilized to resist degradation due to ultraviolet exposure. It is resistant to commonly encountered soil chemicals, mildew and insects, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13, making it one of the most stable polymers available for geotextiles today. We wish to advise that **ProPex 1198** meets the following minimum average roll values:

Property	Test Method	Minimum Average Roll Value (English)	Minimum Average Roll Value (Metric)
Grab Tensile	ASTM-D-4632	300/200 lb	1.33/0.890 kN
Grab Elongation	ASTM-D-4632	15 %	15 %
Mullen Burst	ASTM-D-3786	450 psi	3100 kPa
Puncture	ASTM-D-4833	120 lb	0.530 kN
Trapezoidal Tear	ASTM-D-4533	65 lb	0.285 kN
UV Resistance	ASTM-D-4355	90 % at 500 hr	90 % at 500 hr
AOS	ASTM-D-4751	40 sieve	0.425 mm
Permittivity	ASTM-D-4491	0.50 sec^{-1}	0.50 sec^{-1}
Flow Rate	ASTM-D-4491	35 $gal/min/ft^2$	1420 $L/min/m^2$

Amoco Fabrics and Fibers Company manufacturers the woven fabric indicated above. The values listed are a result of testing conducted in on-site laboratories. A letter certifying the minimum average roll values will be issued from the manufacturing plant by the Quality Control Manager at the time shipment is made.

DATE ISSUED: 06/03/02

Amoco Fabrics and Fibers Company
260 The Bluffs
Austell, GA 30168
PH: 770/944-4569
FX: 770/944-4584

Published by Amoco Fabrics and Fibers Company

Amoco Fabrics and Fibers Company, a part of BP

bp

ProPex®
geotextiles

1199

ProPex 1199 is a polypropylene woven fabric. This engineered geotextile is stabilized to resist degradation due to ultraviolet exposure. It is resistant to commonly encountered soil chemicals, mildew and insects, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13, making it one of the most stable polymers available for geotextiles today. We wish to advise that **ProPex 1199** meets the following minimum average roll values:

Property	Test Method	Minimum Average Roll Value (English)	Minimum Average Roll Value (Metric)
Grab Tensile	ASTM-D-4632	370/250 lb	1.64/1.11 kN
Grab Elongation	ASTM-D-4632	15 %	15 %
Mullen Burst	ASTM-D-3786	480 psi	3300 kPa
Puncture	ASTM-D-4833	135 lb	0.600 kN
Trapezoidal Tear	ASTM-D-4533	100/60 lb	/0.265 kN
UV Resistance	ASTM-D-4355	90 % at 500 hr	90 % at 500 hr
AOS (1)	ASTM-D-4751	70 sieve	0.212 mm
Permittivity	ASTM-D-4491	0.28 sec^{-1}	0.28 sec^{-1}
Flow Rate	ASTM-D-4491	18 $gal/min/ft^2$	730 $L/min/m^2$

(1) max. average roll

The values listed are a result of testing conducted in on-site laboratories. A letter certifying the minimum average roll values will be issued from the manufacturing plant by the Quality Control Manager at the time shipment is made.

DATE ISSUED: 06/03/02

Amoco Fabrics and Fibers Company
260 The Bluffs
Austell, GA 30168
PH: 770-944-4569
FX: 770-944-4584

Published by Amoco Fabrics and Fibers Company

bp

Shelter-Rite® TRUCK TARPS
By Seaman Corporation

STANDARD

STYLE 3522

HIGH PERFORMANCE
22-oz. FABRIC
Typical Properties

Base Fabric Type	Polyester
Base Fabric Weight (nominal)	6.0 oz/yd^2
Finished Coated Weight	22 oz/yd^2
ASTM D751	+2/-1 oz/yd^2
Tongue Tear	*8" x 10" sample @ 12"/minute*
ASTM D751	150/150 lb_f
Grab Tensile ASTM D751	450/450 lb_f
Strip Tensile ASTM D751 Procedure B	325/300 lb_f /in
Adhesion ASTM D751 RF Weld	10 lb_f /in
Hydrostatic Resistance ASTM D751 Procedure A	500 psi
Low Temperature	*1/8 in mandrel, 4 hr*
ASTM D2136	**LTC:** Pass @ -40° F **LTA:** Pass @ -67° F
Flame Resistance	Sample not consumed
FMVSS 302	Pass 4 in/min.
Roll Specifics	Width up to 75 in. Length 110 yd.

Unless stated otherwise, values presented above represent the minimum expected measurements at the time of manufacture. We believe this information is the best currently available on the subject. We offer it as a suggestion in any appropriate experimentation you may care to undertake. It is subject to revision as additional knowledge and experience are gained. We make no guarantee of results and assume no obligation or liability whatsoever in connection with this information.

Issued November 2006

Style 3022 PVC fabric for oil boom systems

FABRIC SPECIFICATIONS

Seaman Corporation

3022 fabric	Standard	Metric
Base Fabric Type Base Fabric Weight (nominal) Coating Type	Nylon 6.0 oz/yd² Flexible PVC	Nylon 203 g/m² Flexible PVC
Finished Coat Weight ASTM D751	22.0 oz/yd² ±2/-1 oz/yd²	746 g/m² ±70/-35 g/m²
Tongue Tear ASTM D751	8″ x 10″ sample@12 in/min 150/150 lb_f	20.3 cm x 25.4 cm sample@30.5 in/min 668/668 N
Grab Tensile ASTM D751	500/400 lb_f	2225/1780 N
Strip Tensile ASTM D751 Procedure B	400/300 lb_f/in	356/267 daN/5 cm
Adhesion ASTM D751 Dielectric Weld	10 lb_f/in	9 daN/5 cm
Hydrostatic Resistance ASTM D751 Procedure A	500 psi	3.45 MPa
Low Temperature ASTM D2136 1/8″ mandrel, 4 hrs	Pass @ -40° F	Pass @ -40° C
Chemical Resistance ASTM D471 7day immersion	Crude Oil: <15% wt loss Diesel Fuel: <15% wt loss Gasoline: <25% wt loss	
Flame Resistance FTMS 191A Method 5910	Sample not consumed within 2 minutes	

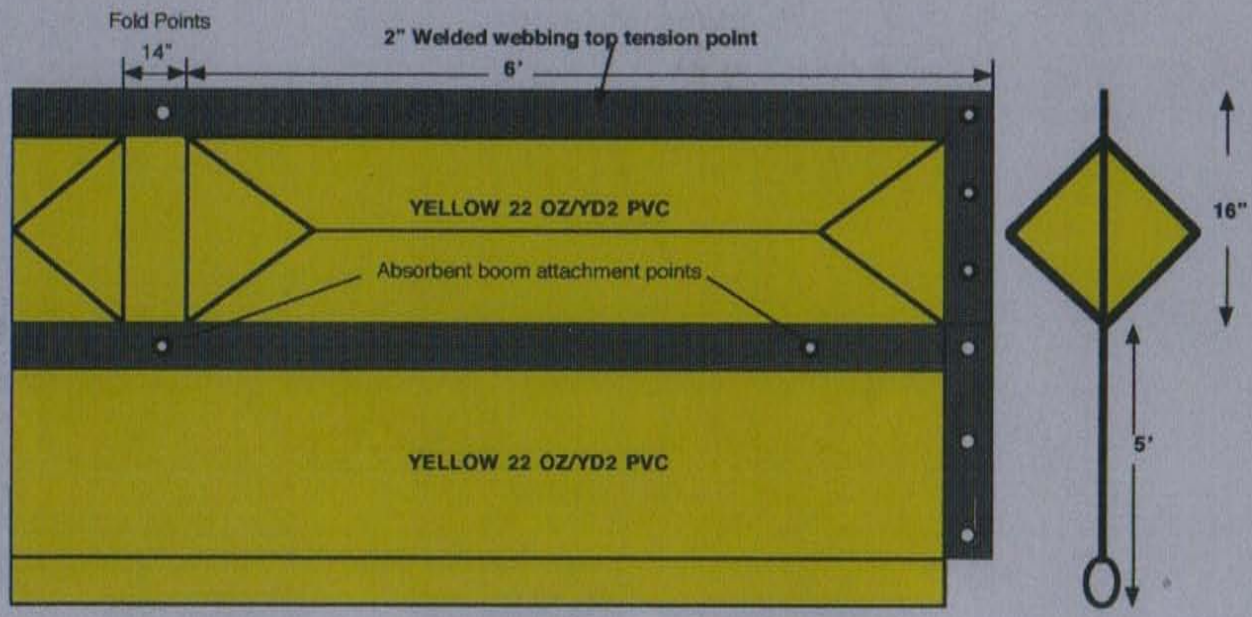
We believe this information is the best currently available on the subject. We offer it as a suggestion in any appropriate experimentation you may care to undertake. It is subject to revision as additional knowledge and experience are gained. We make no guarantee of results and assume no obligation or liability whatsoever in connection with this information. In case of conflict between standard and metric specifications, standard shall apply.

1000 VENTURE BLVD. WOOSTER, OHIO 44691 USA, U.S. Toll-Free: Phone 800-927-8578, Fax 800-649-2737
Phone 330-262-1111, Fax 330-263-6950 www.seamancorp.com

Revised 2/1/99

USACE TYPE IIIB HD SILT CURTAIN

Corps BMP 27 Flotation -	Type III Silt Curtain -
Flotation	10" x 10" x 6' extruded polystyrene foam - 44 lbs/lft carrying capacity
Flotation cover:	22 oz/yd2 PVC with 2" top tension web.
Skirt...	22oz/yd2. PVC coated polyester - impermeable
Section connectors:	ASTM Universal slide aluminum connectors with locking pins (Optional)
Tension points:	3/8" chain ballast and 4,000 lb webbing
Curtain connectors:	2" 3,000 lbs webbing with #4 Spur grommets on 12" centers

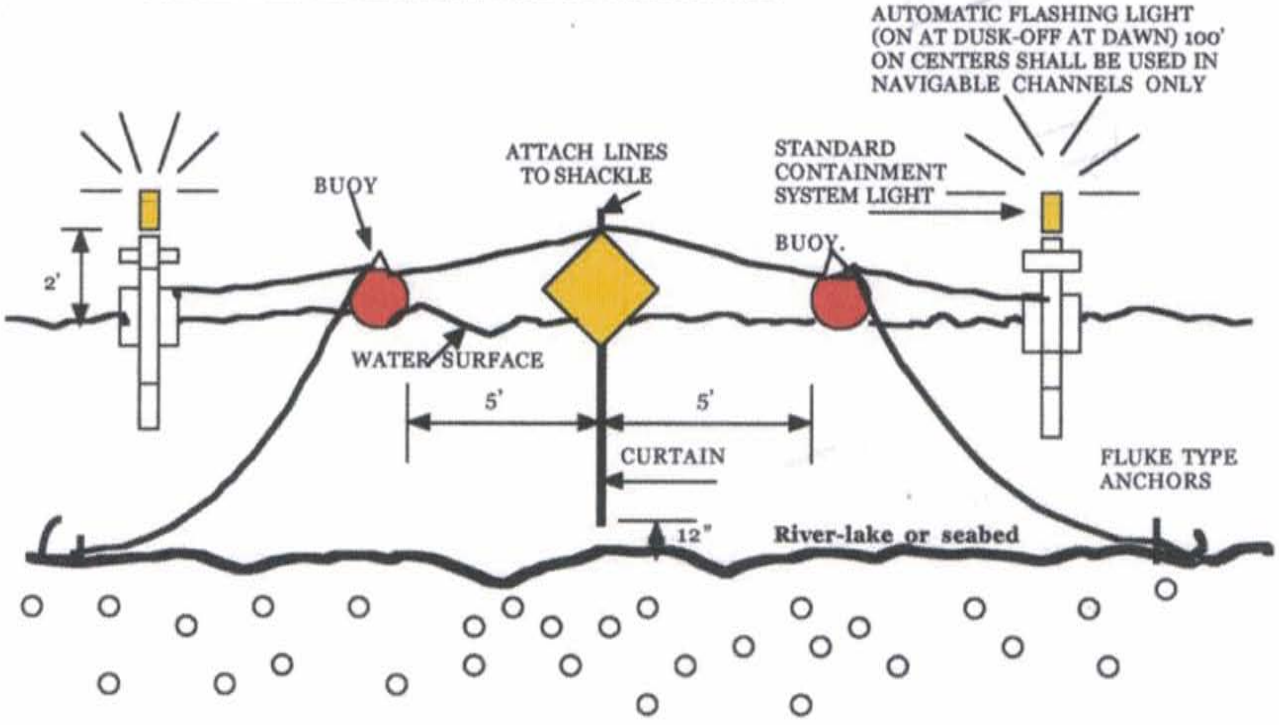


Bill Moffat Sales
Cell: 206 790 9648
Tel: 425 672 9690 541 923 5336
Fax: 425 775 7082 541 923 3574
e-mail: bmoffat7 @msn.com

ORIENTATION WHEN INSTALLED

(TIDAL SITUATION - TYPE III)

NOTE: ANCHORING WITH BUOYS, AS SHOWN REMOVES ALL VERTICAL FORCES FROM THE CURTAIN. HENCE, THE CURTAIN WILL NOT SINK FROM WIND OR CURRENT LOADS



Boom Anchorage

In tidal or moving water conditions, provisions must be made to allow the volume of water contained within the curtain to change. Since the bottom of the curtain is weighted and external anchors are frequently added, the volume within the curtain will be greater at high tide versus low tide and measures must be taken to prevent the curtain for submerging. In addition to allowing for slack in the curtain to rise and fall, water must be allowed to flow through the curtain if the curtain is to remain in roughly the same spot and to maintain the same shape. Normally, this is achieved by constructing part of the curtain from a heavy woven filter fabric. The fabric allows the water to pass through the curtain, but retains the sediment pollutants. Consideration should be given to the volume of water pass through the fabric and the sediment particle size when specifying fabric permeability.

Sediment that has been deflected and settles out by the curtain may be removed if so directed by the on-site inspector or the Plan-Approving Authority. However, consideration must be given to the probable outcome of the procedure – will it create more of a sediment problem resuspension of the particles and by accidental dumping of the material by the equipment involved? It is, therefore recommended that the soil particles trapped by a turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse. Regardless of the decision made, soil particles should always be allowed to settle for a minimum of 6-12 hours prior to their removal by equipment or prior to removal of a turbidity curtain.

It is imperative that the intended function of the other controls in this chapter, to get sediment out of the watercourse , be the strategy used in every erosion control plan. However, when proximity to the watercourse makes successfully mitigating sediment loss impossible, the use of the turbidity curtain during land disturbance is essential.

Design Criteria

1. Type I configuration (see Figure 27-1) should be used in protected areas where there is no current and the area is sheltered from wind and waves.

2. Type II configuration (see Figure 27-1) should be used in areas where there may be small to moderate current running up to 4 km/hr or q m/sec (2 knots or 3.5 feet per second) and/or wind and wave action can effect the curtain.

3. Type III configuration (see Figure 27–2) should be used in areas where considerable current up to 6 km/hr or 1.5 m/sec (3 knots or 5 feet per second) may be present, where tidal action may be present and/or where the curtain is potentially subject to wind and wave action

4. Turbidity curtains should extend the entire depth of the watercourse whenever the watercourse in question is not subject to tidal action and/or significant wind and wave forces.

   In tidal and/or wind and wave action situations, the curtain should never be so long as to touch the bottom. A minimum of 300 millimeters (1-foot) "gap" should exist between the weighted lower end of the skirt and the bottom at "mean" low water. Movement of the lower skirt over the bottom due to tidal reverses or wind and wave action on the flotation system may fan and stir sediments already settled out.

5. .In tidal and/or wind and wave action situations, it is seldom practical to extend a turbidity curtain depth lower than 3 to 4 meters (10-12 feet) below the surface, even in deep water. Curtains which are installed deeper than this will be subject to very large loads with consequent strain on curtain materials and the mooring system. In addition, a curtain installed in such a manner can "billow up" towards the surface under pressure of the moving water, which will result in an effective depth which is significantly less than the skirt depth.

6. Turbidity curtains should be located parallel to the direction of flow of a moving body of water. Turbidity Curtains should not be placed across the main flow of a significant body of moving water.

7. When sizing the length of the floating curtain, allow an additional 10-20% variance in the straight line measurements. This will allow for measuring errors, make installing easier and reduce stress from potential wave action during high winds.

8. And attempt should be made to avoid excessive amounts of joints in the curtain; a minimum continuous span of 15 meters (50 feet) between joints is a good "rule of thumb".

9. For stability reasons, a maximum span of 30 meters (100 feet) between joints (anchor and stake locations) is also a good rule to follow.

10. The ends of the curtain, both floating upper and weighted lower, should "tend" well up into the shoreline, especially if high water conditions are expected. The ends should be secured firmly to the shoreline (preferably to rigid bodies such as trees or piles) to fully enclose the area where sediment may enter the water.

11, When there is a specific need to extend the curtain to the bottom of the watercourse in tidal or moving water conditions, a heavy woven pervious geotextile fabric may be substituted for the normally recommended impervious

geotextile. This creates a "flow-through" medium which significantly reduces the pressure on the curtain and will help to keep it in the same relative location and shape during the rise and fall of tidal waters.

12. Typical alignments of turbidity curtains can be seen in Figure 27-3. The number and spacing of external anchors may vary depending on current velocities and potential wind and wave action; manufacturer's recommendations should be followed.

Construction Specifications

Materials

1. Barriers should be a bright color (yellow or "international" orange are recommended) that will attract the attention of nearby boaters.

2. The curtain fabric must meet the minimum requirements noted in Table 27-1

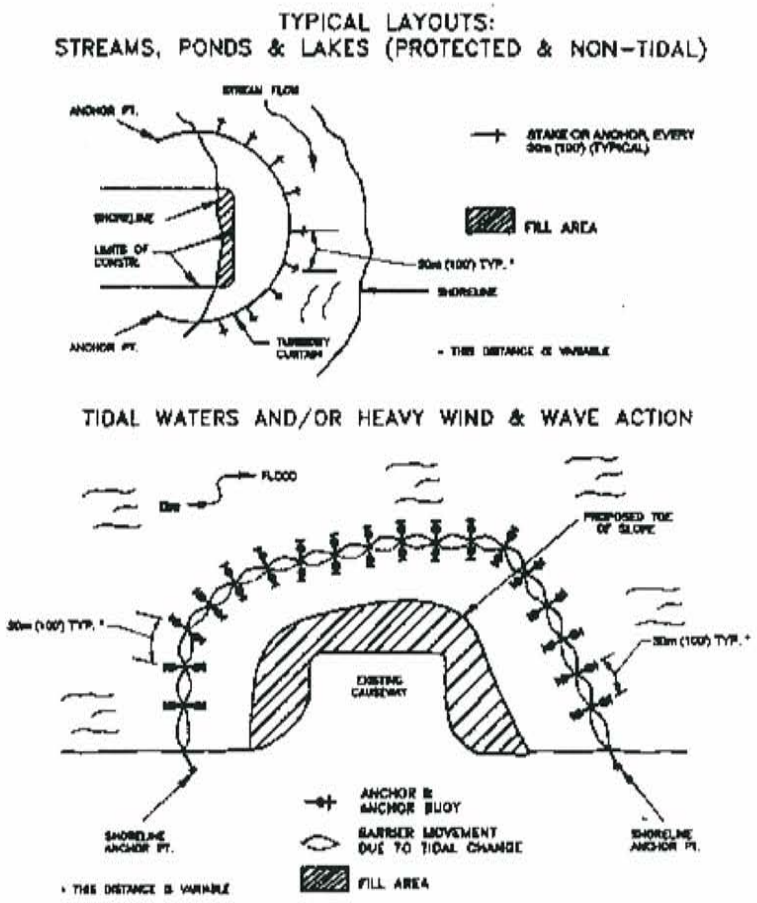
3. Seams in the fabric shall be either vulcanized welded or sewn, and shall develop the full strength of the fabric.

4. Flotation devices shall be flexible, buoyant units in an individual flotation sleeve or collar attached to the curtain. Buoyancy provided by the flotation units shall be sufficient to support the weight of the curtain and maintain a freeboard of at least 3inches above the water surface level (see Figure 27-2)

Table 27-1
Physical properties of turbidity curtain fabric

Physical Property	**Requirement**	
Thickness	.045 mills	
Weight	**grams meter2**	**ozs/yd2**
Type I	610	18 oz/yd2
Type II	610 0r 746	18 or 22 oz/yd2
Type III	746	22 oz/yd2
Grab Tensile	136 kilograms	300 pounds
UV Inhibitor	Must be included	

FIGURE 27-3: TURBIDITY CURTAIN



2. Load lines must be fabricated into the bottom of all floating turbidity curtains. Type II and Type III must have load lines also fabricated into the top of the fabric. The top load line shall consist of woven webbing or vinyl-sheathed steel cable and shall have a break strength in excess of 4,500 kilograms (10,000 pounds). The supplemental (bottom) load line shall consist of a chain incorporated into the bottom hem of the curtain of sufficient weight to serve as ballast to hold the curtain in a vertical position. Additional anchorage shall be provided as necessary. The load lines shall have suitable connecting devices which develop the full breaking strength for connecting to load lines in adjacent sections (see Figures 27-1 and 27-2 which portray this orientation).

3. External anchors may consist of wooden or metal stakes 50 x 100 millimeters (2" x 4") or 60 millimeter (2.5") minimum diameter wood or 2 kilogram per linear meter steel (1.33 pounds/linear foot) when Type I installation is used; when Type II or Type III installations are used, bottom anchors should be used.

4. Bottom anchors must be sufficient to hold the curtain in the same position relative to the bottom of the watercourse without interfering with the action of the curtain. The anchor may dig into the bottom (grappling hook, plow or fluke type) or may be weighted (mushroom type) and should be attached to a floating buoy via an anchor line. The anchor line would then run from the buoy to the top load line of the curtain. When used with Type III installations, these lines must contain enough slack to allow the buoy or curtain down and must be checked regularly to make sure they do not become entangled with debris. As previously noted, anchor spacing will vary with current velocity and potential wind and wave action; manufacturer's recommendations should be followed. See orientation of external anchors and anchor buoys for tidal installation in Figure 27-2

Installation

1. In the calm water of lakes and ponds (Type I installation) it is usually sufficient to merely set the curtain end stakes or anchor points (using anchor buoys if bottom anchors are employed), then tow the curtain in the furled position out and attach it to these stakes or anchor points. Following this, any additional stakes or buoyed anchors required to maintain the desired location of the curtain may be set and these anchor points made fast to the curtain. The furling lines should be cut to let the curtain skirt drop

2. In rivers or in other moving water (Type II and Type III installation) it is important to set all the curtain anchor points. Care must be taken to ensure

that anchor points are of sufficient holding power to retain the curtain under the existing current conditions, prior to putting the furled curtain into the water. Again, anchor buoys should be employed on all anchors to prevent the current from submerging the flotation at the anchor points. If the moving water in to which the curtain is being installed is tidal and will subject the curtain to currents in both directions as the tide changes, it is important to provide anchors on both sides of the curtain for two reasons:

a) Curtain movement will be minimized during tidal current reversals.

b) The curtain will not overrun the anchors and pull them out when the tide reverses.

When the anchors are secure, then furled curtain should be secured to the upstream anchor point and sequentially attached to each next downstream anchor point until the entire curtain is in position. At this point, and before unfurling, the lay of the curtain should be assessed And any necessary adjustments made to the anchors. Finally, when the location is ascertained to be as desired, the furling lines should be cut to allow the skirt to drop.\

3. Always attach anchor lines to the flotation device, not to the bottom of the curtain. The anchoring line attached to the flotation device on the downstream side will provide support for the curtain. Attaching the anchors to the bottom of the curtain would cause premature failure of the curtain due to the stresses imparted on the middle section of the curtain.

4. There is an exception to the rule that curtains should not be installed across channel flows; it occurs when there is a danger of creating a silt build-up in the middle of a watercourse, thereby blocking access or creating a sand bar. Curtains have been used effectively in large areas of moving water by forming a very long sided, Sharp "V" to deflect clean water around a work site, confine a large part of the silt-laden water to the work area inside the "V" and direct much of the silt toward the shoreline. Care must be taken, however, not to install the curtain perpendicular to the water current.

5. See Figure 27-3 for typical installation layouts

Removal

1. Care should be taken to protect the skirt from damage as the turbidity curtain is dragged from the water.

2 The site selected to bring the curtain ashore should be free of sharp rocks, broken cement, debris, etc. So as to minimize damage when hauling the curtain over the area.

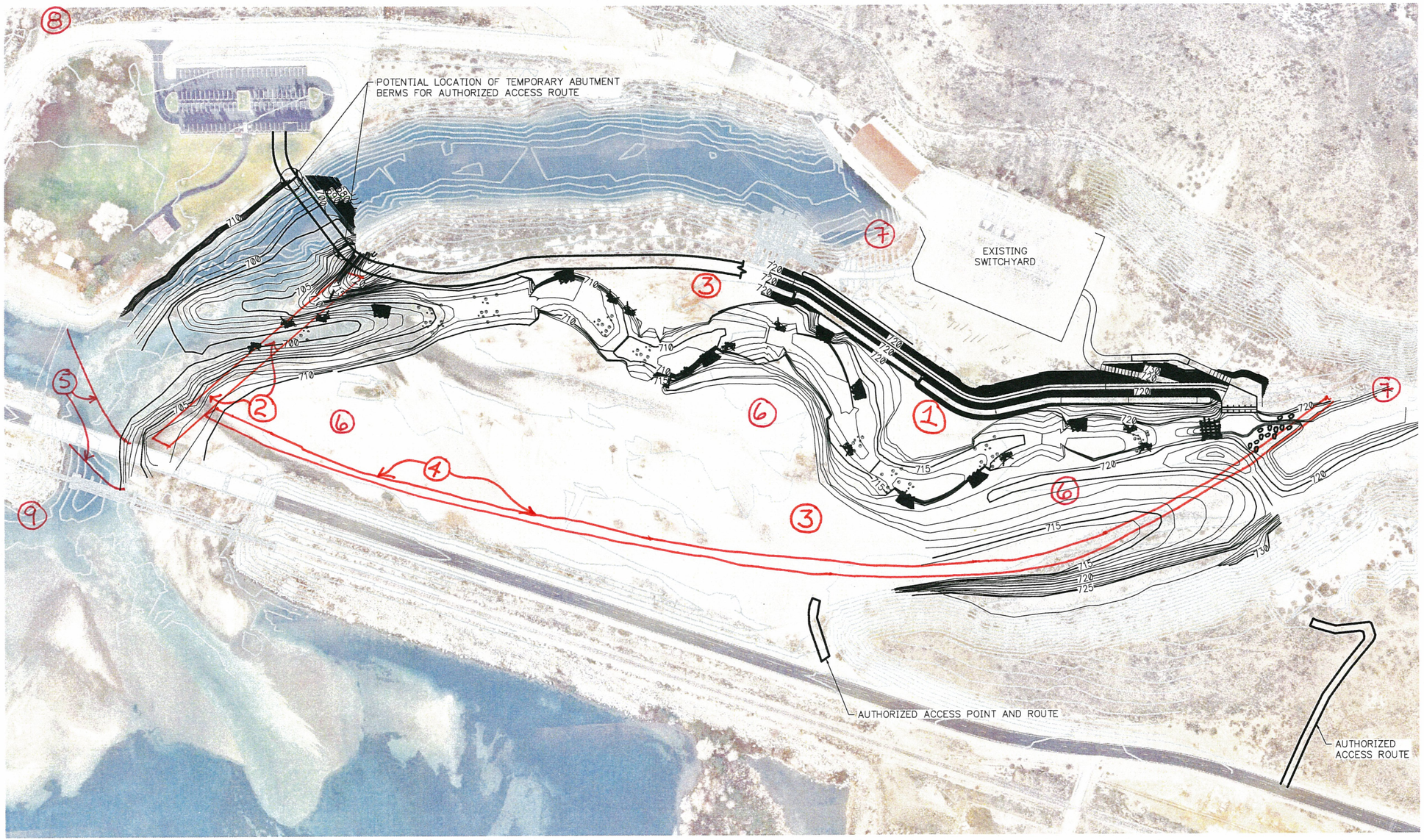
3. If the curtain has a deep skirt, it can be further protected by running a small boat along its length with a crew installing furling lines before attempting to remove the curtain from the water.

Maintenance

1. The developer/owner shall be responsible for maintenance of the filter curtain for the duration of the project in order to ensure the continuous protection t of the watercourse.

2. Should repairs to the geotextile fabric become necessary, there are normally repair kits available from the manufacturers; manufacturer's instructions must be followed to ensure the adequacy of the repair.

3. When the curtain is no longer required as determined by the inspector, the curtain and related components shall be removed in such a manner as to minimize turbidity. Remaining sediment may be removed and the original depth (or plan elevation) restored. Any spoils must be taken to upland area and be stabilized.



NOTE:

1. SEE SECTION D SITE ACCESS OF THE TECHNICAL SPECIFICATIONS FOR MORE INFORMATION ON THE AUTHORIZED ACCESS ROUTES.

LEGEND

- LOG JAM
- V-LOG JAMS
- BOULDERS

JAY S. KIDDER — STATE OF WASHINGTON — 25495 — REGISTERED PROFESSIONAL ENGINEER — EXPIRES: 5-1-2008

ORIGINAL SIGNED BY: JAY S. KIDDER, P.E.
DATE ORIGINAL SIGNED:
DOCUMENTS STORED AT PUD NO. 1 OF CHELAN COUNTY, WENATCHEE, WA

CONSULTANT		CHELAN PUD NO.1	SCALE 1" = 100'		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG. J. KIDDER							
2ND ENG. P. POWERS	PRIM. ENG.						
DESIGNER C. REYNOLDS	2ND ENG.	0	FEB 6, 2008				
APPROVAL J. KIDDER	PROJ. MGR: V. CHAMBERLAIN	REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

CHELAN RIVER PROJECT

AUTHORIZED ACCESS ROUTES OVERALL PLAN

BID 08-01

SHEET R47 OF R50
REVISION 0
DATE FEB 6, 2008
DWG 0330-50CI-0052

ORIG. DRAWN
ORIG. DATE FEB 6, 2008

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

Feb 06, 2008 4:02pm tgriga K:\Jobs\340034-Chelan_River\100% Anchor Edits\100% CP\DV0330-50CI-0052.dwg CI-0052

Attachment D:

Industrial Absorbents.pdf

Attachment E:

Map Legend:

1. Pre Construction Staging area to mobilize equipment.
2. Temporary berm to be installed prior to building diversion channel. Berm will be built parallel to the tailrace channel in order to contain turbid water within the diversion channel and allow it to settle out prior to the spill event from the dam.
3. Equipment staging, fueling and maintenance areas to be used during construction.
4. Berms will be put in place using native materials from the diversion channel excavation in order to keep all spill flows within the excavated channel.
5. Potential locations for oil absorbant booms.
6. Areas where screening of materials will likely take place.
7. Background turbidity monitoring sampling locations.
8. Designated concrete washout area.
9. Compliance turbidity monitoring sampling locations.