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IMPORTANT INFORMATION

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Environmental Management Act

Finfish Aquaculture

Waste Control Regulation

[includes amendments up to B.C. Reg. 4/2010, January 14, 2010]

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Definitions

1 In this regulation:

"abundance" means the number of individual organisms or percent cover of a particular taxon in the benthic community at the Linnaean classification system level of

(a) family, for soft bottoms, and

(b) class, for hard bottoms;

"application" means application under section 3;

"bag cage" means an enclosure in a marine environment made of material impermeable to water and used to contain finfish;

"baseline" means before a facility begins operating;

"Beggiatoa" is a genus of bacteria that forms white mats on the sediment surface in areas of intense organic enrichment;

"benthic" means on or in the seabed;

"benthic community" means the assemblage of organisms inhabiting the seabed;

"biota" means the benthic flora and fauna;

"BMP" means a Best Management Practices Plan described in section 8;

"Capitella" is a genus of polychaete that thrives in areas of intense organic enrichment;

"containment structures" means net cages, bag cages, tanks, and similar structures used to contain finfish for the purposes of aquaculture;

"containment structure array" means a group of containment structures physically attached to each other;

"DGPS" means a differential global positioning system;

"domestic sewage" means human excrement, water-borne human excretion or the water-carried wastes from liquid or non-liquid culinary uses, washing, cleansing, laundering, food processing or ice production;

"dry weight" means the gravimetric determination of the total residue left in a vessel after drying feed of the type used at the facility at a temperature of 103 to 105 degrees Celsius until the weight of the residue is constant;

"epifauna" means animals that live on top of the substratum;

"facility" means a finfish aquaculture farm located in marine water at a site licensed under section 14 of the *Fisheries Act*;

"facility sampling station" does not include a reference station;

"finfish" means fish of the classes Agnatha, Chondrichthyes or Osteichthyes grown by an operator;

"fish kill" means an amount of finfish equivalent to 4 000 kilograms or more that died within a 5 consecutive day period at a facility;

"footprint" means the area of the seabed on which there is a measurable accumulation of particulate wastes, or waste by-products, originating from a containment structure or a containment structure array and deposited by normal ocean currents;

"free sulphide" means sulphide ions not chemically bound to any other chemical constituent as measured following sections 3 to 5 of Protocols for Marine Environmental Monitoring (WLAP 2002);

"hard bottom" means a seabed composed of rock, shell or other hard materials that cannot be sampled by sediment grab sampling devices;

"infauna" means animals that live within the substratum;

"L&WBCI" means the Land & Water British Columbia Inc.;

"macrofauna" means animals with body sizes on the scale of millimetres;

"management plan" means a Marine Commercial Finfish Aquaculture Management Plan required when applying for a licence for aquaculture under the *Fisheries Act*, for a tenure, or for a renewal of either;

"megafauna" means animals with body sizes on the scale of centimetres;

"mortalities" means facility raised finfish that

(a) have died, and

(b) are not harvested for human consumption;

"net cage" means a net enclosure used to contain finfish;

"operational monitoring" means gathering information as discussed in Schedule B;

"operator" means a person who oversees the operation of a facility and who

(a) owns the facility, or

(b) is authorized by the owner to act for the owner respecting the operation of the facility;

"peak biomass" means maximum biomass of finfish within a facility during a production cycle;

"perimeter of containment structure" means the outside edge of the containment structure wherever the structure is located at the time of sampling;

"probable footprint" means the likely footprint associated with proposed locations of containment structures, or containment structure arrays, determined by using a method which satisfies the criteria in Schedule B or by using an alternative method approved by a director;

"production cycle" means the period of time from stocking the containment structures to the time of harvest or removal of all finfish from the containment structures;

"qualified professional" means an applied scientist or technologist acting within that profession's field of professional practice who

(a) is registered in British Columbia with an appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association, and

(b) through suitable education, experience, accreditation and knowledge may be reasonably relied on to provide advice in designing and conducting aquatic impact assessment programs;

"reference station" means a sampling station

(a) within 0.5 to 2.0 kilometres from the tenure,

(b) having the same types of habitats and similar hydrographic, physical and morphological characteristics as the facility sampling stations, and

(c) representing background variation;

"sampling station" means a location where samples are taken or variables are measured or observed;

"soft bottom" means a seabed composed of gravel, sand, mud or similar materials that can be sampled using sediment grab sampling devices;

"statistically significant" means an observed effect so large that it would rarely occur by chance as described in Section 7 of Protocols for Marine Environmental Monitoring (WLAP 2002);

"taxon richness" means the number of taxa in the benthic community at the Linnaean classification system level of

(a) family, for soft bottoms, and

(b) class, for hard bottoms;

"tenure" means

- (a) a contiguous area of land that is owned, leased or otherwise lawfully occupied by a person, or
- (b) areas of land whether contiguous or not that are occupied under a single
 - (i) lease, or
 - (ii) licence of occupation

granted under the *Land Act* for a facility;

"WLAP" means the Ministry of Water, Land and Air Protection of British Columbia;

"wastes" includes finfish feed, finfish faeces, mortalities, bloodwater, materials from net washing, disinfectants, refuse and domestic sewage;

"zero metre station" means a fixed, DGPS location, at the perimeter of the containment structure and on each transect described in Schedule B measured at higher high water referenced to chart datum.

[am. B.C. Regs. 321/2004, s. 10 (a) and (b); 4/2010, s. 6.]

Introduction of waste into the environment

2 An operator may introduce waste, or cause or allow waste to be introduced, into the environment within the tenure occupied by the operator's facility if the operator and the facility satisfy the requirements of this regulation.

[en. B.C. Reg. 321/2004, s. 10 (c).]

Registration

3 (1) The operator of a facility that commences operation for the first time on or after the date this regulation comes into force must have monitored the facility in accordance with Schedule A before applying for registration of the facility under this regulation.

(2) Subject to subsection (3), an operator must not stock a facility with finfish unless the facility is registered under this regulation.

(3) On or before the date a facility commences operation, the operator must apply to a director for registration of the facility under this regulation.

(4) The application for registration under subsection (3) must be submitted directly to the director in electronic form, or in another form and manner acceptable to the director, and must include:

- (a) the business name, mailing address, telephone number and fax number of the operator;
- (b) the registered name and address of the operator;
- (c) the common name and geographical description of the facility;
- (d) location maps showing
 - (i) general location of the facility at 1:50 000 to 1:150 000, and
 - (ii) geo-referenced location of the facility to Crown lands tenure of the facility on British Columbia Geographic System (cadastral) map at 1:20 000;
- (e) a 1:5 000 scale aerial view diagram showing the tenure boundaries and the proposed layout of all structures at the site;
- (f) the aquaculture licence number issued under the *Fisheries Act*;

- (g) the aquatic land tenure file number issued under the *Land Act*;
- (h) in accordance with the provisions of Schedule A of this regulation,
- (i) baseline inventory including currents information, if the facility commences operation after the coming into force of this regulation, and
- (ii) currents information for existing facilities for which this information has not yet been provided under the Interim Monitoring Program conducted in 2000 and 2001 for WLAP;
- (i) the design production rate in tonnes for each production cycle and the number and species of finfish to be stocked;
- (j) the planned monthly feeding summary over the production cycle and stocking densities;
- (k) the number and dimensions of containment structures to be used;
- (l) the total dry weight of feed usage in tonnes, for the production cycle prior to registration, or, for new facilities, the estimated dry weight feed in tonnes expected to be used for the first production cycle of operation;
- (m) further information if any specified by the director.

(5) If the information described in subsection (4) is included in the management plan for an aquaculture licence under the *Fisheries Act*, the management plan may be submitted as the application to register under subsection (3).

(6) The manager may give written notice to a person within 30 days of receipt of an application from the person requiring that the application be revised to conform to the requirements of this regulation.

(7) Registration under this section takes effect on the later of

- (a) the date the application is received by the manager, or
- (b) if written notice is given under subsection (6), the date the manager is satisfied with the revisions to the application.

(8) An operator must, within 30 days of changes to the information submitted under subsection (4), submit revised information to the manager in the form and manner required by subsection (4) for

- (a) a change in information described in subsection (4) (a) to (g),
- (b) a change of 20% or more to parameters described in subsection (4) (i) or (j), and
- (c) a change of 20% or more to volume of containment structures described in subsection (4) (k).

[am. B.C. Reg. 321/2004, s. 10 (d) to (f).]

Production cycle standards for sites with soft bottoms

4 (1) Subject to section 11 (2), the mean free sulphide concentration at a facility sampling station on a soft bottom at or beyond 30 metres from the zero metre station must not be statistically significantly greater than 6 000 micromolar.

(2) Subject to section 11 (2),

- (a) the mean taxon richness at a facility sampling station on a soft bottom at or beyond the tenure perimeter must not be statistically significantly different than the mean reference or baseline taxon richness, and
- (b) the mean total abundance at a facility sampling station on a soft bottom at or beyond the tenure perimeter must not be statistically significantly different than the mean reference or baseline total abundance.

[am. B.C. Reg. 321/2004, s. 10 (g).]

Chemical trigger for sites with soft bottoms

5 Subject to section 11 (2), if at a facility sampling station on a soft bottom at or beyond the tenure perimeter the mean free sulphide concentration is statistically significantly greater than the mean reference or baseline sulphide concentration, the operator must

- (a) conduct biological monitoring in accordance with section 9 (3) and (4), and
- (b) comply with the pre-stocking requirement in section 6 (3).

[am. B.C. Reg. 321/2004, s. 10 (g).]

Pre-stocking requirements for sites with soft bottoms

6 (1) Subject to section 11 (2), if at a facility sampling station on a soft bottom at or beyond 30 metres from the zero metre station the mean free sulphide concentration is statistically significantly greater than

- (a) 1 300 micromolar, and
- (b) the mean reference or baseline sulphide concentration,

and does not exceed the standard in section 4 (1), the operator must not stock the facility until the mean sulphide concentration at each of these stations is not statistically significantly greater than

- (c) 1 300 micromolar, or
- (d) the mean reference or baseline sulphide concentration.

(2) Subject to section 11 (2), if at a facility sampling station on a soft bottom at or beyond 30 metres from the zero metre station the mean free sulphide concentration exceeds the standard in section 4 (1), the operator must not stock the facility until the following criteria are met:

- (a) the mean free sulphide concentration at each sampling station located at the perimeter of the containment structure is not statistically significantly greater than 1 300 micromolar or statistically significantly greater than the mean reference or baseline sulphide concentration;
- (b) biological samples are obtained, analyzed and reported from each sampling station in accordance with section 9 (3) and (4).

(3) Subject to section 11 (2), if at a facility sampling station on a soft bottom at or beyond the tenure perimeter the mean free sulphide concentration exceeds the trigger in section 5, the operator must not stock the facility until the mean free sulphide concentration at each station located at the tenure perimeter is not statistically significantly greater than the mean reference or baseline sulphide concentration.

[am. B.C. Reg. 321/2004, s. 10 (h).]

Domestic sewage

7 An operator must ensure that domestic sewage produced from the facility complies with the following requirements:

- (a) the sewage discharge is exempted under section 2 of B.C. Reg. 129/99, the Municipal Sewage Regulation;
- (b) the following apply:

- (i) the maximum daily discharge rate does not exceed 2.5 m³/day;
- (ii) the domestic sewage is treated by
 - (A) a septic tank designed with a retention time of not less than 2 days prior to discharge, or
 - (B) a device other than a septic tank with the concentration of total suspended solids in the effluent not exceeding 130 mg/L;
- (iii) the location of the sewage discharge point to the environment is at a depth no less than 15 metres below the surface of the water;
- (iv) all records related to the construction, operation and maintenance of sewage treatment and disposal works are retained for inspection by a director or an officer.

[am. B.C. Reg. 321/2004, s. 10 (f), (i) and (j).]

Best management practices plan

8 (1) An operator must implement a Best Management Practices Plan for the operation and maintenance of the facility consistent with the following objectives:

- (a) compliance with the requirements in sections 5 and 6 and the standards in section 4;
- (b) continual reduction of the discharge or potential discharge of the number and quantity of wastes and pollutants;
- (c) management of potentially harmful materials including therapeutants, therapeutic additives, anaesthetics, disinfectants, pesticides, wood preservatives, antifouling agents, bloodwater and net-cleaning wastes and wastewater to preclude spillage to the environment, and capacity to respond appropriately in the event of a spill;
- (d) continual improvement in the feed conversion ratio for feed fed to finfish;
- (e) prevention of the spillage of feed into the environment outside the containment structures;
- (f) prevention of the attraction and access of wildlife to feed, foodstuffs and mortalities;
- (g) prevention of access to containment structures by wildlife;
- (h) collection of mortalities and their disposal in a timely fashion only as authorized under the Environmental Management Act using equipment and locations that
 - (i) preclude spillage to the environment, and
 - (ii) minimize odours during storage and transportation;
- (i) management in accordance with a fish kill contingency plan.

(2) The BMP must include the following:

- (a) a description of specific management practices and standard operating procedures used to achieve the objectives in subsection (1);
- (b) a finfish kill contingency plan;
- (c) a statement that the BMP has been reviewed and endorsed by the operator and reviewed and understood by the individuals responsible for implementation of the plan.

(3) An operator must

- (a) keep a copy of the BMP at the facility and make the plan available, on request, to a director or an officer, and

(b) amend the BMP whenever there is a change in the facility which materially increases the release or potential release to the environment of harmful materials referred to in subsection (1) (c).

(4) If a director provides a written opinion to the operator that a BMP is ineffective in achieving the objectives required by subsection (1), the operator must revise the BMP to ensure that the objectives are met.

[am. B.C. Reg. 321/2004, s. 10 (f), (k) and (l).]

Monitoring

9 (1) An operator must monitor the facility by

(a) surveys of hard bottoms, and

(b) sediment grab sampling of soft bottoms

at all sampling stations in accordance with Schedule B within 30 days of peak finfish biomass for each production cycle.

(2) If containment structures are relocated during a production cycle prior to conducting the monitoring required in subsection (1), the vacated site must be monitored in accordance with Schedule B within 30 days of relocating the containment structures.

(3) If the mean free sulphide concentration at a facility sampling station exceeds a level specified in section 4 or 5, the operator must repeat sulphide monitoring and undertake sediment biological sampling

(a) at least once within 30 days of the date on which the excess was measured,

(b) so that the repeat monitoring and biological sampling take place within 7 days of each other,

(c) at the same stations where the specified level was exceeded, and

(d) in accordance with Schedule B.

(4) An operator must conduct monitoring prior to stocking to confirm compliance with pre-stocking criteria in section 6 if any of the mean free sulphide concentration levels described in section 6 occur, as follows:

(a) if section 6 (1) applies, by conducting sulphide monitoring at the same stations where the specified sulphide level was exceeded;

(b) if section 6 (2) applies, by conducting

(i) sulphide monitoring at the sampling stations located at the perimeter of the containment structure, and at 30 metres from the zero metre station, and

(ii) biological monitoring at the sampling stations at 30 metres from the zero metre station,

which are on the same transects as the stations where the specified sulphide level was exceeded;

(c) if section 6 (3) applies, by conducting sulphide and biological monitoring at each station located at the tenure perimeter where the specified sulphide level was exceeded.

(5) If a containment structure is relocated back to a fallow footprint, the operator must conduct monitoring at the perimeter of the containment structure to confirm compliance with pre-stocking criteria in section 6 (2) (a) prior to stocking the containment structure.

(6) An operator must have the biological samples that are collected under subsections (3) and (4) taxonomically identified to level of family by a taxonomist accredited to perform this analysis, or by another method approved by a

director.

(7) Despite subsection (3) (a), an operator may apply to a director to vary the requirements of that subsection for one of the following reasons:

(a) weather conditions make it impractical to sample within 30 days of the sulphide levels specified in subsection (3) being exceeded;

(b) other legitimate reason for extending the sampling periods.

(8) The monitoring and sampling procedures must be designed and supervised by a qualified professional retained by the operator until a director gives written confirmation that the continuing supervision may be done by trained staff or a contractor.

(9) A supervisor referred to in subsection (8) must provide to the operator a report, signed and dated by the supervisor, containing the results of the monitoring and sampling done using the procedures under that subsection.

[am. B.C. Reg. 321/2004, s. 10 (e), (f) and (m).]

Reporting

10 (1) An operator must send to a director in a format acceptable to the director an email attachment containing an electronic version of the report required under section 9 (9).

(2) The report under subsection (1) must be submitted

(a) within 30 days of monitoring for physical and chemical parameters under section 9 (1),

(b) within 90 days of monitoring by surveys for hard bottoms under section 9 (1), and

(c) within 6 months of collecting samples submitted for taxonomic identification by an accredited laboratory, under section 9 (6), and within 14 days of receipt of the results from the taxonomist.

(3) Despite subsection (2), an operator must report to a director, within 14 days of obtaining monitoring results, if the standards or trigger in section 4 or 5 are exceeded.

(4) An operator must report by January 31 in every year the total dry weight and type of feed, including additives, used the previous calendar year.

(5) An operator must report by March 31 in every year the following for the previous calendar year:

(a) the names of all materials that are directly or indirectly released into the water during the reporting period, including therapeutants, pigments, hormones, pesticides, anaesthetics, antifouling agents, disinfectants, cleansers, therapeutic additives and zinc formulations;

(b) a summary of containment structure dimensions;

(c) the number of mortalities and disposal method used during the reporting period;

(d) a summary of monthly finfish biomass for each month during the reporting period.

(6) An operator must report fish kills to a director within 24 hours of invoking a fish kill contingency plan.

[am. B.C. Reg. 321/2004, s. 10 (f) and (n).]

Management changes and remediation for soft bottoms

11 (1) If the standards described in section 4 are exceeded, the operator must prepare and submit to a director within 30 days of becoming aware of the excess, and immediately thereafter implement, a remedial action plan which

shows how the pre-stocking criteria in section 6 will be met and how deviations exceeding the standards will be avoided in future production cycles.

(2) Despite subsection (1), if containment structures are relocated within the same tenure and provided the footprint at the new location does not overlap the footprint at the previously stocked locations, the footprint of the previously stocked locations will be considered fallow and will be exempt with regards to determining compliance with sections 4 and 6 for the production cycles at the new location.

[am. B.C. Reg. 321/2004, s. 10 (f).]

Annual fees

12 (1) An operator must pay an annual fee by March 31 each year for each registration under section 3 that the operator holds for all or part of the preceding calendar year.

(2) For the purposes of calculating an annual fee under subsection (1), sections 1 and 3 and Schedule C of B.C. Reg. 299/92, the Permit Fee Regulation apply as though

(a) the operator was a permit holder, and

(b) the registration under section 3 was a permit.

(3) For the purposes of calculating the amounts of suspended solids, ammonia and nitrogen and nitrates discharged at a facility during a calendar year,

(a) suspended solids, ammonia and nitrogen and nitrates have the same meaning as in section 1 of B.C. Reg. 299/92, and

(b) each dry weight metric tonne of feed used at the facility, as reported under section 10 (4), in the calendar year shall be equated to an annual discharge at the facility of

(i) 186 kg of suspended solids,

(ii) 36 kg of ammonia, and

(iii) 8 kg of nitrogen and nitrates.

(4) Despite section 3 of B.C. Reg. 299/92, an annual fee under this section is only payable for the suspended solids, ammonia and nitrogen and nitrates calculated under subsection (3) for the facility for the portion of the preceding calendar year for which the facility was registered under section 3 of this regulation.

[am. B.C. Reg. 321/2004, s. 10 (o).]

Offences and penalties

13 (1) An operator must not knowingly

(a) make or participate in, authorize or acquiesce in the making of a false or deceptive statement in a document made or filed under this regulation, or

(b) omit or authorize, or acquiesce in the omission of entries required by this regulation to be included in a document made or filed under this regulation.

(2) Contravention of subsection (1) is an offence punishable by a fine not exceeding \$100 000.

(3) An operator who contravenes section 3 (1), (2) or (8), 4, 5, 6, 7, 8 (3), 9 (1), (2), (3), (4), (5), (6), or (8), 10, 11 (1) or 12 commits an offence punishable by a fine not exceeding \$200 000.

(4) Each day an offence under subsection (3) continues constitutes a separate offence.

Schedule A

Baseline Inventory

[am. B.C. Reg. 321/2004, s. 10 (p).]

Part I — Currents Metering

The following ocean currents metering information is required for registration.

The currents regime at the site must be characterized at 2 depths: approximately 15 metres below the surface and approximately 5 metres above the bottom. Current direction must be measured in degrees true and current speed in centimetres per second. Speed and direction must be recorded at least once every 30 minutes for a period of at least 30 days. The locations where currents are metered must represent currents within the tenure, especially near containment structures and containment structure arrays. Follow the protocols for collecting currents data that appear in Section 1 of Protocols for Marine Environmental Monitoring (WLAP 2002).

Part II — Baseline Monitoring

A. Seabed Characterization

A baseline survey of the seabed within the tenure and at at least 2 reference stations is required. The baseline survey must achieve the following objectives:

- describe variation in substrata, topography and bathymetry throughout the tenure and at reference stations
- locate reference stations with similar depths, substrata and other features
- determine the feasibility of collecting sediment grab samples and identify areas that need video survey for operational monitoring
- collect physical and biological data to compare with data collected during the operational period and to estimate the number of samples needed for operational monitoring.

Surveys of the probable footprints for all proposed locations of the containment structures, or containment structure arrays, are required. They must include enough transects to map all biophysical characteristics to a resolution of 50 metres. To describe depth variation, at least one transect must run perpendicular to the shore starting from the landward boundary of the tenure and running to its opposite perimeter.

B. Video Survey

Each reference station must have 2 video transects, each at least 100 metres long, including one perpendicular to shore. The transects must run straight, with start and end points recorded for future reference.

Surveys must characterize substratum types as bedrock, boulder (>256 millimetres in diameter), cobble (64-256 millimetres in diameter), gravel (2-64 millimetres in diameter), sand (0.0625-2 millimetres in diameter), silt, mud and clay (<0.0625 millimetres in diameter), or shell hash. For combination substrata, relative proportions must be noted (e.g. 50% bedrock: 50% boulder). Some will have associations of organisms or other features which must be identified.

In areas where sediment grab sampling is not possible, the abundances of megafauna, macrofauna and macrophytes must be measured. For megafauna, record moving images along transects. For macrofauna, take still images of quadrats. For macrophytes, use both. There must be enough quadrats to adequately represent each substratum type within all probable footprints. At reference stations, 5 quadrats must be sampled midway on the transects. All images, whether moving or still, must be clear enough for counting and measuring the biota cover. All biota must be taxonomically identified to at least the level of class.

Sediment colour and the presence or absence of fish feed, fish faeces, flocculent organic material, macrophytes, terrigenous material and farm litter must also be recorded for each transect and quadrat. These observations are needed for proper comparison with observations made during operational monitoring. Unique seabed features or areas of interest must also be mapped.

The baseline survey must follow the protocols for video surveys in section 2 of Protocols for Marine Environmental Monitoring (WLAP 2002) unless an alternative method has been authorized by a director, and the alternative method will meet the objectives for the baseline survey set out at the beginning of this Part.

C. Sediment Sampling

Following conduct of the video or alternate survey, sediment grab sampling is required wherever physically possible.

Grab sampling obtains physical, chemical and biological data to be used to determine the number of samples needed for operational monitoring and to be compared against the operational data. Within each of the probable footprint or accumulated probable footprints a minimum of 3 grab samples must be taken for each sediment type and if only one sediment type is present, then a minimum of 5 grab samples must be taken. Two reference stations must be selected (as described for video surveys above) and at least 3 grabs must be taken at each reference station. Follow the sediment sampling protocols in Sections 3 and 4 of Protocols for Marine Environmental Monitoring (WLAP 2002).

The following physical and chemical parameters must be measured whenever a sediment grab sample is taken:

- free sulphides¹
- redox potential¹
- total volatile solids or total organic carbon
- sediment grain size (% gravel, sand, silt, mud and clay)
- total zinc (at sites where zinc is used in feed formulations)
- total copper (at sites where copper is used as an antifouling agent)
- other contaminants (if required by a director) such as pesticides, therapeutic additives, therapeutants, pharmaceuticals, wood preservatives and persistent organic compounds
- other parameters if required by a director.

Record this additional information:

- sediment colour, odour and texture
- presence or absence of gas bubbles, Beggiatoa, fish feed, fish faeces, flocculent organic material, macrophytes, terrigenous material and farm litter.

Biota must be taxonomically identified to the level of species and counted. Also identify and count individuals of Capitella. After being processed, samples must be archived for at least 5 years. These samples must be properly stored and maintained.

Part III — Reporting

The location of each substratum type, currents metering, facility sampling stations, reference stations and transects must be reported on maps. Appropriate scale must be used for easy identification. Qualified professionals providing positional information must be aware that DGPS is not always available to adequate resolution (± 10 m) because of the topography of adjacent land or for other reasons. Therefore, alternative methods of positioning may be needed.

Another map must show depths across the tenure and at reference stations. Map contours must be at a maximum of

10-metre intervals (or equivalent intervals expressed in alternative units). Marine charts may be used, provided that they report the 10-metre depth interval and are accurate for the specific site. However, companies may choose to collect their own bottom contour information if accurate charts are not available, or to be consistent with other information, such as a profile view of the facility.

Data submissions for currents metering (at both depths) must include:

- electronic files of the raw data, indicating current speed and direction for each sampling interval
- hard copies of the summary data presented in tabular frequency distribution.

The data must be provided in an electronic ASCII or MS Excel file format. The data must also be accompanied by adequate reporting information as indicated below. The hard-copy summaries must show current speed and current direction.

Both raw data and summary data must include measurements made between the first and the last good record time only. All data recorded before or after complete deployment of the meter must be removed prior to submission.

Videotape submissions must be accompanied by a detailed narrative or written assessment prepared by a qualified professional describing benthic conditions along transects and in quadrats. The video and report must identify the location of each transect and the location of the camera along each transect.

All physical, chemical and biological data gathered from video surveys and sediment sampling must be submitted in a standard electronic format. Spreadsheet templates, available from WLAP, are to be used for submitting these data and other information. Each data submission must be accompanied by a statement indicating that these Schedules and the Protocols for Marine Environmental Monitoring (WLAP 2002) were followed. If there are any deviations from these, there must also be a written statement justifying the deviations.

Schedule B

Operational Monitoring

[am. B.C. Reg. 321/2004, s. 10 (q) and (r).]

The main purposes of operational monitoring are to determine whether a facility meets chemical and biological requirements and standards, and to define the spatial and temporal extent of the facility's effects. All monitoring programs must have the basic study design features described in Section 7 and Appendices of Protocols for Marine Environmental Monitoring (WLAP 2002). Any additional design features must be provided by a qualified professional.

The probable footprint of the waste discharges must be determined prior to designing the impact study. Methods to estimate that footprint may include currents metering, video surveys, sonar techniques, reconnaissance grab sampling, hydrodynamic modeling or other methods.

Part I — Hard Bottom Survey

If satisfactory sediment samples cannot be obtained using grab samplers — because of hard surfaces, rocks or other coarse material — perform a video survey, or an alternative hard bottom survey if an alternative method is approved by a director, of the footprint or accumulated footprints. Have it analyzed by a qualified professional as described in Schedule A following the methods described in Section 2 of Protocols for Marine Environmental Monitoring (WLAP 2002).

For video surveys, the following 2 types of video surveys must be conducted:

Megafauna transect survey

This identifies and quantifies megafauna and macrophytes from moving images obtained along transects. These

transects may also be used to define the extent of observable physical and biological changes, such as sediment colour, presence of organic sediments, feed pellets, farm litter or Beggiatoa mats.

Macrofauna quadrat survey

This consists of still images of quadrats used to identify and quantify macrofauna and macrophytes. These are normally on or adjacent to the megafauna transect.

Each transect must start at the perimeter of the containment structure, or containment structure array, and extend to the perimeter of the tenure, along the prevailing current. There must be one transect for each of 2 dominant current directions of each containment structure or array. If adjacent containment structures, or arrays, are less than 60 m apart, they must be treated as if they were a single array when transects are positioned. A transect must not extend beneath an adjacent containment structure or array.

Alternate transect designs might be acceptable, provided that there is adequate supporting information to show that the transects represent the spatial extent and magnitude of effects, considering the tenure's currents regimes.

For each transect place at least 5 macrofauna quadrats at each of these stations: perimeter of containment structure or array, 30 metres from the zero metre stations and on the perimeter of the tenure.

At least 2 reference stations must be surveyed, with one transect at least 100 metres long at each. These must be the same reference stations as those surveyed during baseline inventory, or for existing sites, established for the Interim Monitoring Program 2000. In the absence of established sites documentation must be provided to show the reference sites meet the criteria in Section 2 B of Protocols for Marine Environmental Monitoring (WLAP 2002).

Data analyses must be performed according to the statistical protocols described in Section 7 of Protocols for Marine Environmental Monitoring (WLAP 2002) to determine whether the facility has had any statistically significant effects.

Part II — Sediment Sampling

Sediment sampling also requires a transect approach. Each transect must start at the perimeter of the containment structure, or containment structure array, and extend along the dominant currents to the perimeter of the tenure. There must be one transect for each of 2 dominant current directions for each containment structure or array. If adjacent containment structures, or arrays, are less than 60 m apart, they must be treated as if they were a single array when transects are positioned. A transect must not extend beneath an adjacent containment structure or array.

Each transect must have sampling stations located at the perimeter of the containment structure at 30 metres from the zero metre station and at the tenure perimeter. A zero metre station must be established for each transect. Each 30 metre station must be located along the dominant current using DGPS.

Alternate transect designs might be acceptable, provided that there is adequate supporting information to show that the transects represent the spatial extent and magnitude of effects, considering the tenure's currents regime(s). Two or more reference stations must be sampled at the same locations as those surveyed for baseline inventory, or for existing sites, established for the Interim Monitoring Program 2000. In the absence of established sites documentation must be provided to show the reference sites meet the criteria in Section 2 B of Protocols for Marine Environmental Monitoring (WLAP 2002).

The following physical and chemical parameters must be measured at the perimeter of containment structures, or of containment structure arrays and at reference stations during operational monitoring:

- free sulphides²
- redox potential²
- total volatile solids or total organic carbon
- sediment grain size (% gravel, sand, silt, mud or clay)

- total zinc (at sites where zinc is used in feed formulations)
- total copper (at sites where copper has been used as an antifouling agent)
- other contaminants (if required by a director) such as pesticides, therapeutic additives, therapeutants, pharmaceuticals, wood preservatives and persistent organic compounds
- other parameters if required by a director.

Free sulphide and redox potential monitoring must be also conducted at stations at 30 metres from the zero metre station, and at the perimeter of the tenure.

A minimum of 3 grab samples must be taken at each station. If the mean free sulphide concentration of the 3 grabs at a given facility station exceeds a requirement or standard (not statistically), then 2 additional grabs must be taken for sulphides and redox potential.

Where biological sediment samples are needed, the abundance of infauna and epifauna must be quantified. Within the tenure, at least 5 sediment grabs are needed for each station. At each reference station, at least 3 grabs are needed. Biota must be taxonomically identified to at least the level of family. Also identify individuals of *Capitella*. After processing, samples must be archived for at least 5 years. These samples need to be properly stored and maintained.

Perform data analyses according to the protocols described in Section 7 of Protocols for Marine Environmental Monitoring (WLAP 2002) to determine whether the facility has had any statistically significant effects.

Part III — Reporting

Reporting must be carried out in the same manner and to the same extent as set out in Part III of Schedule A.

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1. Follow the protocols for measuring free sulphides and redox potential in Sections 5 and 6 of Protocols for Marine Environmental Monitoring (WLAP 2002).
 2. There are specific protocols for measuring free sulphides and redox potential. Follow all sediment sampling protocols in Sections 3, 4, 5 and 6 of Protocols for Marine Environmental Monitoring (WLAP 2002).

Note: this regulation replaces B.C. Reg. 470/88.

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