California's Construction General Permit Web Conference

Session II: Navigating the Newly Adopted Regulations

Thursday, October 1, 2009

12:00 Noon Pacific

For audio participation
Dial: 866.253.6505; Passcode 1396988

FOLEY
FOLEY & LARDNER LLP

Nautilus Environmental

Whitson CM
CONTRACTING & MANAGEMENT, INC.

Presenters

Wayne S. Rosenbaum
Partner
Foley & Lardner LLP

Presenters

David Roberts, PhD
Environmental Scientist
Nautilus Environmental

Presenters

Shaun Flater, CPSWQ, CPESC
Division Manager
Whitson CM Inc.

Outline

- Monitoring and reporting requirements
- Implementing the monitoring program
  - Preparation, sampling and handling
- Bioassessments
  - Background, procedures, time estimates
- Active Treatment Systems (ATS)
  - Toxicity & monitoring requirements

MRP – Risk Level 1

- Visual monitoring of non-stormwater discharge
- Pre-storm visual inspections
- Post-storm visual inspections
- Focus on BMPs, no sampling required

MRP – Risk Level 2

- All of RL1 requirements, plus:
- Rain Event Action Plans (REAP)
- Daily inspections of discharges during storms
- Samples from discharge points and ATS (if used)
- Turbidity NAL – 250 NTU
- pH Lower NAL – 6.5, upper NAL – 8.5
- *Storm event averages*

MRP – Risk Level 3

- All of RL2 requirements, plus:
- Receiving water quality monitoring when in violation of NEL for duration of permit
- Rapid Stream Bioassessments at qualifying sites
- Turbidity NEL - 500 NTU, 10 NTU for ATS (20 NTU for single sample)
- pH Lower NEL – 6, Upper NEL – 9
- *Storm event daily averages*

Turbidity

*Any single sample maximum

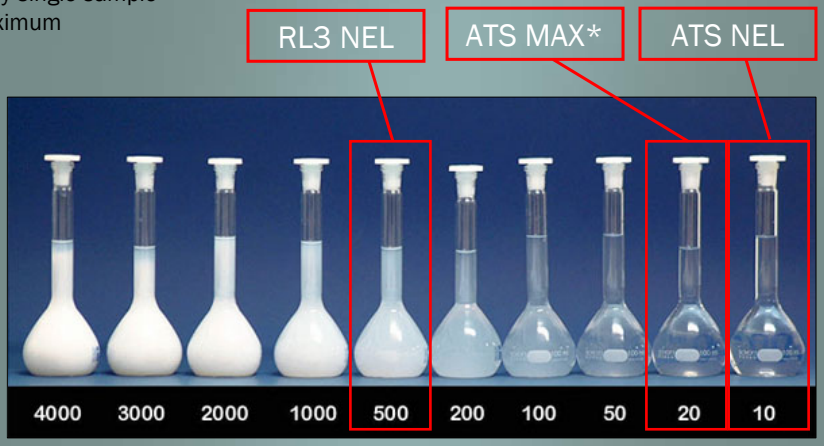


Image from: www.optek.com

Implementation

- RL2 and RL3 storm water sampling guidelines
  - *Minimum* 3 grab samples/day of discharge per site
  - No requirement as to when/where data collected
  - Overall requirement is an accurate characterization of site runoff
- *Minimum* pH, turbidity (RL2, RL3), Suspended Sediment Concentration (RL3 in violation of turbidity NEL)
- pH on-site, turbidity on-site or off-site (on-site strongly recommended)
- SSC will require analytical laboratories

Collecting Measurements

- Meters need to be calibrated at least once each day that measurements are taken
  - 3 point calibration using pH and turbidity standards
- Measurements/samples taken at point of discharge
- Will require planning
  - Where are the sampling points?
  - Who is responsible for meter calibration and sampling?
  - What is the weather forecast for the next week?

Measurements

- pH and Turbidity meters
  - Most accurate, most costly
  - Rapid readings
  - Meter requires calibration/training

- pH test kit
  - Cheaper, but consumable
  - Not as accurate as a pH meter

- pH indicator paper
  - Not approved for use

Stormwater Sample Collection & Handling

- Pre-cleaned containers provided by laboratory
- Rinse containers in site water
- Minimal headspace
- Holding times
  - SSC – 7 days
  - Volume – minimum 1-L
- Chain of Custody documentation

Additional Monitoring for RL3

- Receiving water quality upstream and downstream
  - Triggered by violation of NEL, for duration of permit
- If 2 or more discharges to same water-body, a single downstream sample is sufficient
  - Additional sampling may be beneficial
- Where are sampling locations?
  - Ideally mid-stream and at mid-depth, but safety is priority
- Are they accessible? Who is responsible? Will multiple field meters be needed?

Additional Monitoring for RL3

- Bioassessments
  - Triggered by ***direct*** discharge to *either* a:
    - 303(d) listed sediment-impaired stream, or
    - SPAWN, COLD *and* MIGRATORY habitat
  - Total ground-disturbance > 30 acres

- *Direct discharge: "A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff."*
- Encompasses most, if not all, common discharge scenarios

Bioassessment

- Assesses the biological condition of wadeable streams
  - Wadeable = "Streams that can be sampled by field crews wearing chest waders (generally less than 1.0 m deep)" (Ode, 2007)

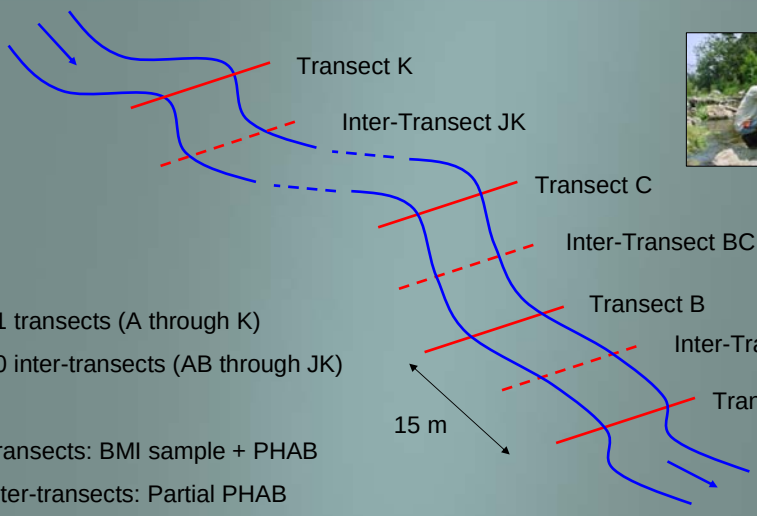
- Sample instream biology, Index of Biotic Integrity
  - Benthic macroinvertebrates (BMI), requires taxonomic laboratory

- Instream & riparian physical habitat (PHAB)
  - Data collected in the field by field crew

Bioassessment

- Reachwide benthos multi-habitat procedure with "full" PHAB
- Requires a trained & audited field crew
- Samples a 150-m stream "reach"
- Single composite invertebrate sample from each site
  - 1 site = 1 sample

Bioassessment



- 11 transects (A through K)
- 10 inter-transects (AB through JK)

- Transects: BMI sample + PHAB
- Inter-transects: Partial PHAB

Physical Habitat Components

- Transect Substrates
  - Depth, grain size, organic matter, macro/microalgae, macrophytes, cobble embeddedness
  - 105 point-counts for each metric per site
- Stream dimensions
  - Wetted width, bankfull width and height
- Riparian vegetation
- Instream habitat complexity
- Densiometer (canopy cover)
- Human influence
- Bank stability
- Flow habitats
- Discharge measurements
- Ambient water quality measurements
- Stream gradient and sinuosity

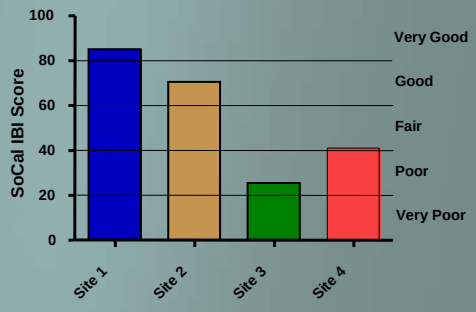
Index of Biotic Integrity

- IBI = Index of Biotic Integrity

- Standardized regional index that allows comparisons between sites and through time
- Responsive to a variety of stresses:
  - E.g. nutrient enrichment, sedimentation etc.
- Specific to region (e.g. SoCal, Central Valley etc.)

IBI Categories

- IBI groups sites into broad categories
- Ease of interpretation for regulators and other end-users
- E.g. SoCal IBI:
  - Very good: 80 - 100
  - Good: 60 - 79
  - Fair: 40 - 59
  - Poor: 20 - 39
  - Very poor: 0 - 19



Index Period

- Bioassessments conducted within region-specific index period
- Standardized relative to seasonal effects to improve comparative ability

March

May

Index Periods

- http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/cgp_biomap.pdf

Bioassessment Activities

- Reconnaissance
  - Obtaining access permissions etc.
- Fieldwork
  - 2 sites/day, ~4 person crew, ~10 h/day
  - Assumes easy access to sites
- Taxonomy
- Reporting

vs

- Ease of access influences fieldwork time commitments

Permit Study Design

- Bioassessments to be conducted:
  - Upstream & downstream of discharge
  - Before & after construction
- For multiple discharges to the same water-body, 1 upstream and 1 downstream sample is sufficient
- One winter resulting in runoff must transpire prior to collecting "after" samples
  - Long-term effects of the discharge (i.e. persisting for several months to a year)

Bioassessment Exemption

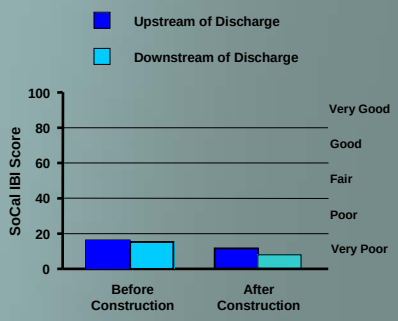
- Exemption from bioassessment for construction activities initiated outside of index period
  - Are access issues grounds for exemption?
- *The catch…*
  - Must invest into SWAMP bioassessment program
  - $7,500 x No. samples required
  - Lowest possible cost:
    - 1 discharge, 4 samples
    - **4 x $7,500 = $30,000**
  - Approximately double the cost of an equivalent bioassessment

What is the aim of bioassessment?

- Three possible uses of data for CGP:
  - Site-specific compliance monitoring
  - Regional/state-wide assessment of effects
  - Complement to on-going bioassessment efforts
- Permit language and study design suggest an attempt to determine effects of construction
- Several potential issues with the design as a barrier to achieving these goals

Thoughts on the Design

- Isolating the effects of construction sites from pre-existing impacts
- Resolution/ability to detect effects limited

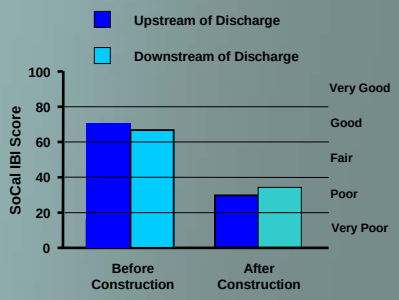


Thoughts on the Design

- Direct discharge:
  - *"A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff."*
- Definition includes discharges to storm systems
- Can we attribute any effects in receiving waters directly to a specific site or land use?

Thoughts on the Design

- Use of upstream locations as references
  - Statistical non-independence
  - Biological non-independence
  - Natural variation along streams



For further discussion see Hughes et al (1986)

Thoughts on the Design

- Lack of temporal replication
- Confidence in accuracy of estimates before and after?

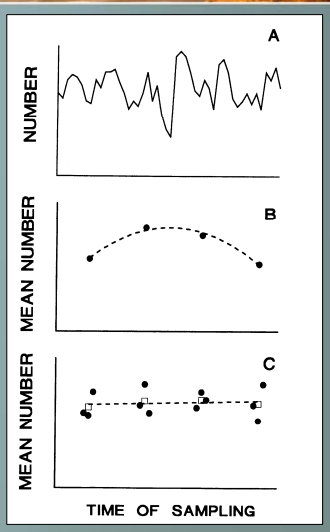
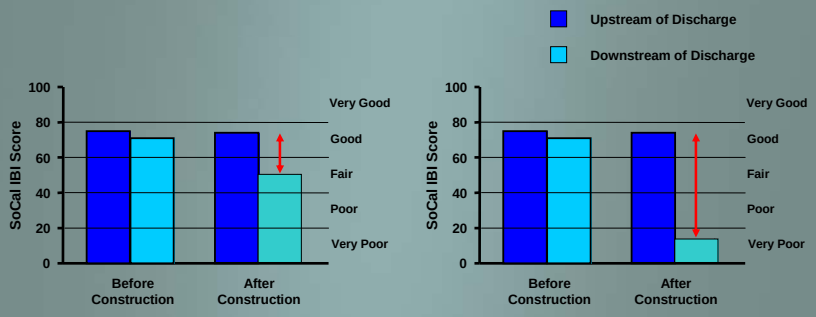


Image taken from Underwood (1994)

How Will Decisions Be Made?

- Not defined in the permit
  - Data reflective of an impact can/should be determined *a priori*
  - How will data be assessed? What will an impact look like?

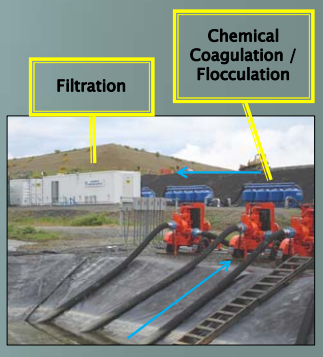


Possible Implications

- Environmental:
  - Possible impacts may go undetected
  - May confuse natural fluxes with impacts of construction
- Economic
  - Liability based on limited data?

ATS Requirements

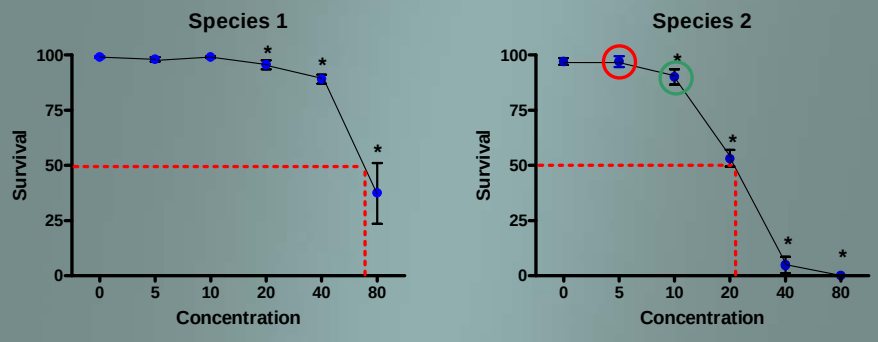
- Toxicity of flocculants to aquatic life often unknown, variable and/or difficult to predict
- Permit requires:
  - Measurement of influent and effluent flow, pH & turbidity every 15 minutes
  - On-site testing for residual coagulants with monthly duplicate analyses by lab
- Flocculant-specific Maximum Allowable Threshold Concentration (MATC) determined through toxicity screening



Maximum Allowable Threshold Concentration (MATC)

- MATC = Mean of NOEC and LOEC for most sensitive species
- NOEC – No observable effect concentration
  - The highest concentration that exhibits no statistically observable toxicity
- LOEC – Lowest observable effect concentration
  - The lowest concentration that exhibits statistically observable toxicity

Calculating MATC



- MATC = (NOEC + LOEC)/2 = 7.5

Residual Coagulant Test Requirements

- Validation by accredited laboratory
  - Test protocol, detection limits
- Method Detection Limit (MDL) < 10% MATC
- Produces a result within 1 hour of sampling
- If conditions cannot be satisfied, or residual test does not exist… operate in batch mode

Batch Operation Mode

- Alternative to residual chemical testing:
  - Operate in batch mode
  - Toxicity testing on each batch
  - Test *initiated* prior to discharge

Fathead minnow

- Proposed test species:
  - Preferred – Fathead minnow (*Pimephales promelas*)
  - Alternative – Rainbow trout (*Oncorhynchus mykiss*)
- Considerations
  - 96-h test protocol
  - Sample hold-time is 36 hours
  - Temperature receipt requirements

Rainbow trout

References

- Surface Water Ambient Monitoring Program protocol (Ode 2007)
  - http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf
- Southern California Index of Biotic Integrity
  - Ode PR *et al* (2005). *Environmental Management*. 35(4); 493-504.
- Bioassessment Index Periods
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- Hughes RM *et al* (1986). *Env. Management*. 10, 629-635.
- Underwood AJ (1994). *Ecol. Apps*. 4; 3-15.

THANK YOU!

Wayne Rosenbaum, Esq.
619.685.6413
srosenbaum@foley.com

Shaun Flater, CPSWQ, CPESC
858.583.0649
sflater@whitsoncm.com

David Roberts, PhD
858.587.7333 (x226)
david@nautilusenvironmental.com

FOLEY
FOLEY & LARDNER LLP

Nautilus Environmental

Whitson CM
CONTRACTING & MANAGEMENT, INC.