SSFL NPDES Outfalls 008 & 009
ISRA & BMP Work Plan Update

SSFL Surface Water Expert Panel
with support from Geosyntec Consultants
August 25, 2011 Public Meeting
Presentation Outline

1. Expert Panel Introduction
2. Monitoring Data Summary
3. BMP Construction Update
4. Northern Drainage RMMP Summary
5. Phytoremediation
6. Q&A
Expert Panel Overview

Member introductions

– Dr. Bob Gearheart, PE, Humboldt State University
– Jon Jones, PE, Wright Water Engineers
– Dr. Michael Josselyn, WRA Consultants
– Dr. Robert Pitt, PE, University of Alabama
– Dr. Michael Stenstrom, PE, Univ. California, Los Angeles
Expert Panel Scope of Work

Improve stormwater quality at NPDES Outfalls 008 and 009

Outfall 008

Outfall 009
Outfall 008 and 009 Watersheds

536 acres
Regulation of SSFL Stormwater

- SSFL surface water discharges (mostly stormwater runoff) are regulated by the LARWQCB through an NPDES permit, which requires:
  - Discharge sampling during storm events, and
  - Compliance with very protective numeric effluent limits for a wide list of pollutants.

- Panel has recommended source removal (e.g., ISRA & site demo) and BMPs to meet the Permit requirements

- BMPs are applied during the remediation and demolition period; ultimately sitewide restoration will occur and stormwater treatment should no longer be necessary
What are Stormwater BMPs?

<table>
<thead>
<tr>
<th>Erosion and sediment controls</th>
<th>Active treatment systems</th>
<th>Natural treatment BMPs</th>
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</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Erosion and sediment controls" /></td>
<td><img src="image2.png" alt="Active treatment systems" /></td>
<td><img src="image3.png" alt="Natural treatment BMPs" /></td>
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Outfall 008/009 BMP Chronology

Year by year visual overview of most significant stormwater quality management activities in these watersheds
2. Monitoring Data Summary
# Four Stormwater Monitoring Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Sampling Locations</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>NPDES</td>
<td>Outfalls (e.g., 008 &amp; 009)</td>
<td>Evaluating permit compliance</td>
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<tr>
<td>ISRA</td>
<td>Up- and downstream of ISRA soil areas</td>
<td>Evaluating performance of ISRA soil removal &amp; restoration</td>
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<tr>
<td>Culvert Modifications (CMs)</td>
<td>Influent and effluent at five CMs</td>
<td>Evaluating performance of CMs</td>
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<tr>
<td>BMP</td>
<td>Downslope of developed areas and/or areas of historic industrial activity (e.g., Area 1 &amp; 2 Landfills)</td>
<td>Planning new BMPs</td>
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Reports to LARWQCB

- 2010 NPDES Annual Monitoring Report
  - Summarized NPDES monitoring data
  - Submitted in March 2011
  - Quarterly reports also submitted periodically
- 2010/11 Rainy Season Annual Report
  - Summarized ISRA, CM, and BMP monitoring data and new BMP recommendations
  - Submitted in late July 2011
- 2011 BMP Work Plan Addendum
  - Describes new BMP design concepts
  - To be submitted in Sept. 2011
- Reports posted on Boeing SSFL website
NPDES (008 & 009)

- 2010/2011 Rainy Season
  - 008: 6 samples collected
  - 009: 13 samples collected
- 2010/11 results for outfalls 008 and 009 show relatively low number of exceedances, particularly given the relatively large number of storms this year
  - 23.5 inches rain this year, ~30% above average
  - 008: 1 lead exceedance
  - 009: 1 lead, 2 dioxin exceedances
ISRA & Culvert Modifications (CMs)

• 2009/2010 Rainy Season – 19.0” rainfall
  – Monitoring conducted at 12 Phase I ISRA areas and 5 CM areas
  – 62 total samples collected from 18 locations

• 2010/2011 Rainy Season – 23.5” rainfall
  – Monitoring conducted at 12 Phase I ISRA areas, 11 Phase II ISRA areas, and 5 CM areas
  – 91 total samples collected from 25 locations
ISRA Performance

• Paired upstream/downstream stormwater sample results now available for 2 rainy seasons (Dec ‘09 – Mar ‘11)
• Panel continuously evaluated these monitoring results
• Line chart (below) is one tool used to compare results

![Line chart showing lead concentration (µg/L) for paired samples from upstream and downstream locations with permit and detection limits.]
ISRA Performance

Findings

• Downgradient concentrations tend to be lower than upgradient samples
• With time, vegetation expected to improve runoff quality
• Results generally below NPDES permit limits
• Fulfilled 2 year data collection commitment in 008

Recommendation

• Continue sampling during 3 storms per year in 008 watershed, and continue sampling all storms in 009
CM Performance

Findings

• Water quality improvement observed, although more data needed to continue to assess performance

• Post-storm observations also demonstrate successful sediment capture

• Boeing and NASA are continuing CM monitoring per Panel’s recommendations

CM3, captured sediment reached top of weir boards, March, 2011:

50 cubic yards of sediment removed from CMs in 2010/11 season!
CM Performance

Statistically significant reduction found for TSS, copper, and lead
Notes:
1) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
2) Besides the Panel's original set of recommended monitoring locations, for the purpose of this BMP siting analysis, per Panel request, these potential BMP subarea monitoring locations include three ISRA performance monitoring sites – A2SW0001 (upgradient of NASA ISRA area and CM1, representing ELV and road runoff), A1SW0004 (upgradient of CM9 and representing Area II Landfill ISRA area and parking lot runoff), and B1SW0011 (upgradient of B1 ISRA area and representing road runoff).
BMP Subareas

2010/2011 Rainy Season
• 13 samples collected from 3 locations in 008 watershed
• 54 samples collected from 19 locations in 009 watershed (includes 6 “stormwater background locations”)

Initial Findings:
• Positive correlations seen between contaminants and suspended sediment, confirming strategy to control erosion
• BMP subarea results generally higher than background sites, supporting the selection of both types of sites
BMP Data Summary – 008 Watershed

- Similar to NPDES & ISRA results, stormwater quality good
- Panel recommends continued erosion control & restoration
- Additional treatment not necessary, but continue to monitor
BMP Data Summary – 009 Watershed

- Most top-ranked BMP locations have significant paved areas – therefore demolition activities are anticipated to have long-term water quality benefits
- New recommended BMPs will address most subareas where monitoring results have been observed above Permit limits
- Key constituents:
  - Dioxin
  - Lead
  - Copper
  - Sediments
BMP Subarea Ranking Analysis Approach

• Key constituents used to prioritize areas for BMP placement
• Innovative, rigorous approach
• Monitoring locations were scored based on number and percent of samples above permit limits and/or background concentrations
• Locations then ranked based on scores, and top locations identified
• This process is repeated annually through 2014
Attachment 1. Summary Flowchart for BMP Site Ranking Analysis Approach

1. Assemble background results from ISRA and BMP monitoring datasets
2. Calculate Particulate Strength concentrations (A) 
   \[ PS = \frac{\text{total-diss.}}{\text{TSS}} \]
3. Assemble potential BMP subarea site monitoring results (concentrations in water, C)
4. Calculate PS concentrations (B)
5. NPDES Permit Limits (D)
6. Compare:
   - Potential BMP site PSs (B) with background PSs (A), and
   - Potential BMP site concentrations (C) with NPDES permit limits (D)

- Determine pollutant-specific weighting factors (WFs) based on number of samples and percent above both critical thresholds.
- Average max metal and max dioxin WFs to determine multi-pollutant “score” for each site.
- Rank potential BMP subarea monitoring sites by multi-pollutant score. Rank potential BMP subarea monitoring sites by TSS WFs.
- Evaluate highest ranked sites for suitability of new erosion or treatment controls, while utilizing best professional judgment to consider multi-pollutant and TSS scores, status of ISRA soil removal, demolition plans, existing or planned BMPs, and other pertinent factors.

BMP siting analysis to be repeated annually, along with evaluation of potential BMP monitoring locations

Proceed with new BMP designs and construction planning for recommended sites.
BMP Subarea Ranking Results

• Top locations initially identified as highest ranked subareas based on multi-contaminant scores. These include:
  – Locations ranked 1st and 2nd highest for each category (metals, dioxins, TSS)
  – Locations that detected the 2,3,7,8-TCDD dioxin congener
  – Locations where new stormwater controls are being constructed
  – 3 subareas that have ISRA activities still planned
New BMP Recommendations for 2012

1. **Helipad (NASA):** Create sheetflow runoff storage and treatment, and/or asphalt removal combined with erosion control, creation of depression areas, and removal of contaminated surface soils

2. **ELV/CM1 (NASA):** ISRA removal with erosion controls, reconstruction of existing drainage ditch below ELV, and installation of new culvert inlet media filter near Helipad Road, also possibly asphalt removal

3. **LOX (NASA):** Sandbag berm and slope drains along northern bank of Northern Drainage, and implement ISRA removal without backfill to encourage infiltration if appropriate

4. **A1LF (Boeing):** Continued maintenance at CM9, asphalt removal, channel armoring erosion control in drainage at base of hillside, and rerouting/treatment of sheet flow from top of landfill
= Locations of new recommended BMPs
Implementation Process
(Stockpile biofilter example)

1. Panel recommendation
2. Conceptual illustration
3. Landowner review/discussion
4. Feasibility assessment
5. Design
6. Permitting – CDFG, ACOE, RWQCB, County...
7. Bid preparation
8. Contractor selection
9. Construction

10-18 months