


SANTA SUSANA FIELD LABORATORY



**NPDES OUTFALLS 008 & 009
SUMMARY OF ACTIVITIES**

March 20, 2013 **SSFL Stormwater Expert Panel** With support from
Geosyntec
consultants

Today's Schedule


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- Welcome/Introductions, 9:00-9:15am
- **Expert Panel Presentation, 9:15-10:00am**
- Biofilter Overview, 10:00-10:35am
- Tour, 10:35am-12:00pm

Outline

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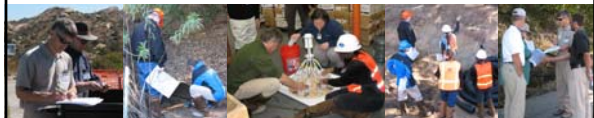
- Introduction
- BMP ranking process
- BMP recommendations
- Recent BMP improvements
- Lower lot biofilter
- 2011/12 data summary
- Tour itinerary



Vegetation regrowth in Watershed 008

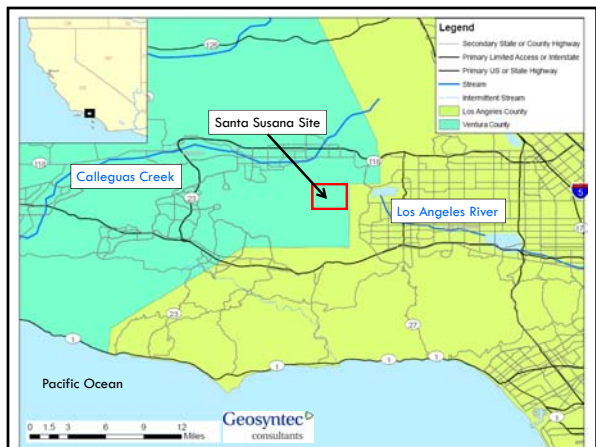
Expert Panel Introductions

- Dr. Bob Gearheart, Humboldt State University
- Jon Jones, Wright Water Engineers
- Dr. Michael Josselyn, WRA Consultants
- Dr. Robert Pitt, University of Alabama
- Dr. Michael Stenstrom, Univ. California, Los Angeles



Expert Panel Scope of Work

- **Independent Expert Panel** was engaged with Regional Board consent to oversee stormwater planning and design work, as well as provide input on monitoring, source removal activities, and various NPDES permit issues
- **Mission:** Improve stormwater quality at NPDES Outfalls 008 and 009
- **Additional responsibilities:** Oversee scientific studies and interface with the public on risk and science communication



Site Introduction

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- 2850-acre former federal government rocket engine testing (1950-2006) and energy research facility (1950-1988)
- Owned by the Boeing Company (post-1966) and the U.S. Government
- Activities currently limited to demolition, remediation, and restoration
- Future parkland and open space



Astronaut Buzz Aldrin at SSFL
(ref. Rocketbyte Archives)

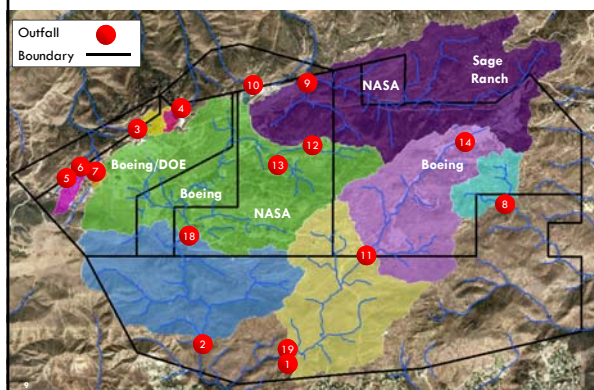
Regulation of SSFL Stormwater

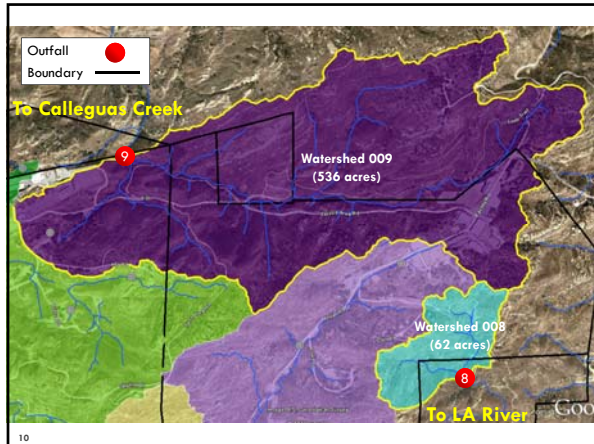
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- Stormwater discharges are regulated by the LARWQCB through an individual NPDES permit, which requires:
 - Composite discharge sampling during storms, and
 - Compliance with very protective Numeric Effluent Limits (NELs)
- NELs for a wide range of constituents including:
 - Dioxins (TCDD TEQ): 2.8×10^{-8} $\mu\text{g/L}$
 - Total Copper: 14 $\mu\text{g/L}$
 - Total Lead: 5.2 $\mu\text{g/L}$



SSFL Outfalls and Property Boundaries





Site Constraints

“End-of-pipe” stormwater controls are not feasible at Outfalls 008 & 009 due to:

- ▣ Feasibility constraints -- steep terrain & limited space
- ▣ Impacts to existing riparian habitat

Outfall 009

The slide contains two photographs. The left one shows a natural stream bed with many large rocks and some vegetation. The right one shows a concrete structure, possibly a weir or a small dam, built across a rocky stream bed.


Overall Stormwater Management Strategy for 008 & 009 Watersheds

- ▣ **Distributed approach** – Given physical constraints, a distributed, watershed-based approach is more appropriate than “end-of-the-pipe” treatment
- ▣ **Iterative & adaptive** – New controls may be incorporated each year based on evaluation of new monitoring data
- ▣ **Redundancy** – Combination of source removal and treatment controls is expected to result in enhanced program effectiveness

BMP Strategies Leveraged

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1. **Source Controls**
 - ISRA soil removal
 - Pavement and building removal
2. **Erosion Controls**
 - Blanket, silt fence, hydroseed/mulch, plantings, etc.
 - Dirt road controls
3. **Treatment Controls**
 - Culvert modifications
 - B1 media filter and sediment basin
 - Temporary sedimentation areas
 - LOX sand bag berms
 - Helipad sand bag berms



BMP Subarea Prioritization Process

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- Innovative, statistically rigorous approach
- Rank potential BMP subarea monitoring sites based on comparisons of:
 - Stormwater subarea concentrations with NPDES permit limits
 - Stormwater subarea particulate strengths with stormwater background particulate strengths
- Monitoring locations were scored based on number and percent of samples above NPDES permit limits and/or background
- Locations then ranked based on scores, and top locations identified
- Best professional judgment for BMP recommendations
- Process to be repeated annually through 2014

2011/2012 Prioritization Results

Rank from Average Watershed	Potential BMP Subarea (Site location/ID)	Watershed	Description	Approx. Upstream AEs (ft.)	Events / Yearly	Multi-Contaminant Score	Rank from Max Metal Yield/yr	Rank from Max Discharge/Week	Rank from TSS Weight
1	EVMP0001 (A1SW0001)*	Outfall 009	ELV road runoff (CM-1 upstream weir)	11.8	14	0.94	1	1	32
2	EBMP0004 (B1SW0015)*	Outfall 009	B-1 media filter inlet north	3.7	2	0.72	9	5	74
3	EBMP0001*	Outfall 009	Lower parking lot 24" stormdrain	23	10	0.68	14	4	39.5
4	EVMP0001-A*	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	2.5	5	0.67	16.5	3	15
5.5	EVMP0002*	Outfall 009	Helipad (pre-sandbag berms)	4.1	6	0.66	15	6	31
5.5	EBMP0002*	Outfall 009	Road runoff to CM-5	2.5	7	0.66	3	12	15
7	A1SW0009-A	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1224 parking lot asphalt removal, pre-filter fabric over weir boards)	16.4	1	0.63	2	19.5	74
8	APMP0001	Outfall 009	Asphalt culvert inlet / road runoff	34	2	0.60	4	19.5	74
9	LPMP0001-A*	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	5.1	6	0.52	30	2	27
10	EBMP0004-S*	Outfall 009	B-2 combined media filter effluent	4.5	5	0.51	16.5	11	15
12.5	B1SW0002*	Outfall 009	B-3 north road runoff	1.3	2	0.50	9	19.5	15
13.5	LPMP0003*	Outfall 006	Lower Parking Lot sheetflow (pre-gravel bag berms)	5.1	2	0.50	9	19.5	15
12.5	LXBM0009*	Outfall 009	LCR east minor tributary	0.43	1	0.50	9	19.5	15
12.5	B1SW0014-A	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	4.7	1	0.50	9	19.5	15
15.5	A2SW0002-A	Outfall 009	CM-5 effluent (post-filter fabric over weir boards)	52.8	4	0.49	18.5	19.5	28.5

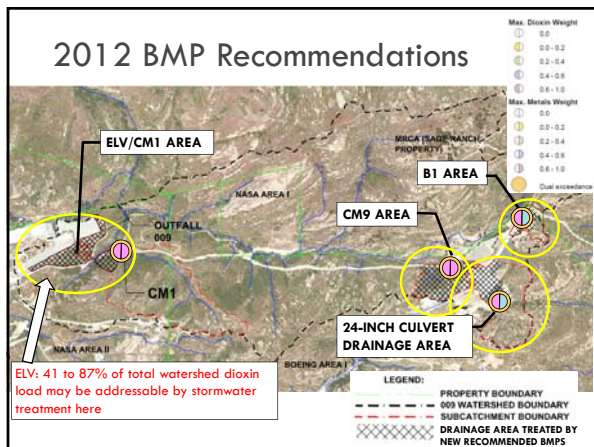
Notes:
 1) Potential BMP subareas sorted by multi-contaminant score, computed as described in Section 5.
 2) (*) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls.
 3) (**) These potential BMP subarea monitoring subareas have not been (i.e., designed and ready for construction) stormwater quality treatment controls.
 4) (**) NPDES outfalls are included for comparison and method testing purposes only, stormwater controls are not being contemplated at these locations.
 5) The rounding of weights may account for similar weights being ranked differently.
 6) Approximate drainage areas based on the cumulative drainage area of the 100MM catchment in which the monitoring location is located (Essextec, 2011). At locations where the monitoring point is upstream of the catchment outfall a "u" sign is used.
 7) Bolded locations indicate that both the NPDES permit limit and 90% percentile background particulate strength threshold were exceeded for any one CEC.

2012 BMP Recommendations

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- New BMPs were chosen for implementation at six of the top seven highest ranked subareas, with multi-constituent scores ranging from 0.63 to 0.94.
- Selected sites were included among the top-ranked sites that:
 - Ranked first through fourth for metals and dioxins;
 - Had **detections of the 2,3,7,8-TCDD** dioxin congener, which is typically associated with anthropogenic sources; and
 - Had the **highest observed dioxin concentrations** (noting that the scores do not explicitly account for concentration *magnitudes*, but rather account for *frequency* of exceeding the concentration-based background and permit limit thresholds).

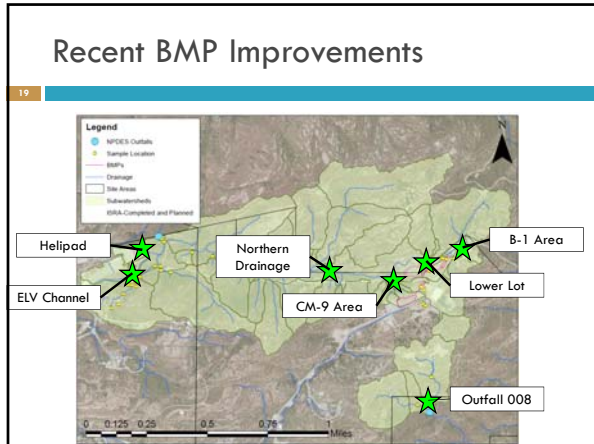
2012 BMP Recommendations

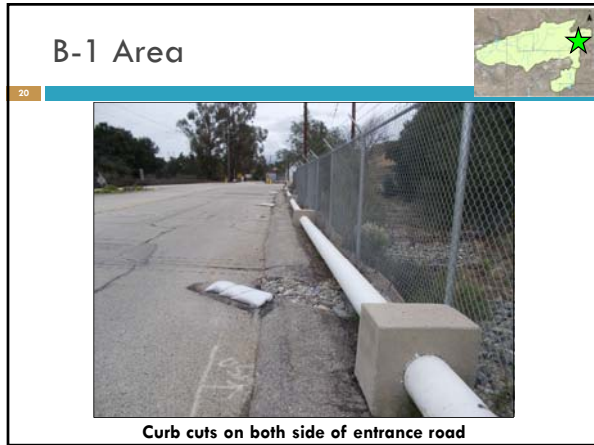


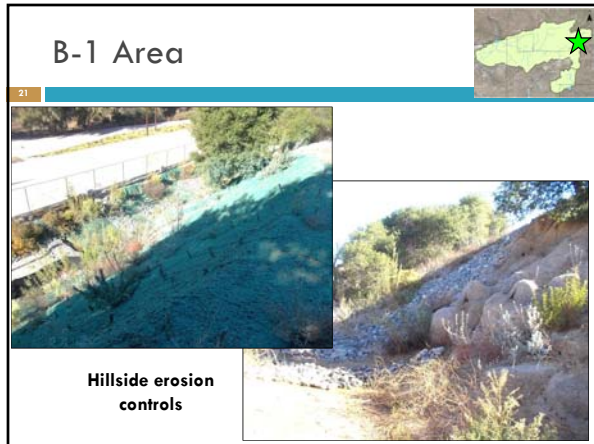
General Project Timeline

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- Data evaluation
 - Site selection
 - BMP conception
 - BMP design
 - Permitting
 - Construction
 - Performance monitoring
- ↓
~12 months
↻
- Future modification (if necessary)








CM-9 Area




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Erosion controls along road, upstream from CM-9

CM-9 Area



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Perforated pipe to spread runoff along hillside

Hydroseed for erosion control


Rock berm creates small sediment forebay

Area 1 Landfill

Culvert inlet filter


Perforated pipe, rock check structure, and erosion controls

ELV Drainage Area



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- Sandbags reduce runoff from building area onto hillside
- Above ground treatment BMP design complete and now going to bid
- BMP implementation targeted this spring




Collect

Treat


Discharge

ELV Channel





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New erosion controls added



Asphalt channel cleared



Helipad



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**Sandbag berm improvements:
Increased height and reduced seepage**


Retained flow is pumped to Silvernale Pond for treatment



Northern Drainage




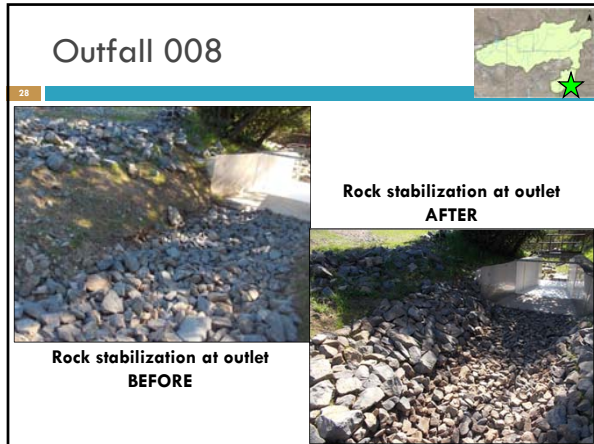
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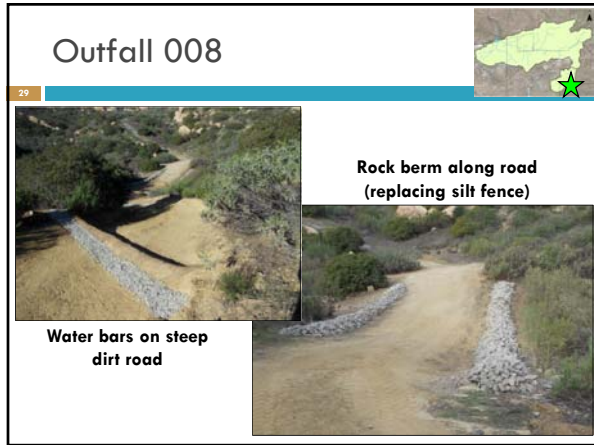


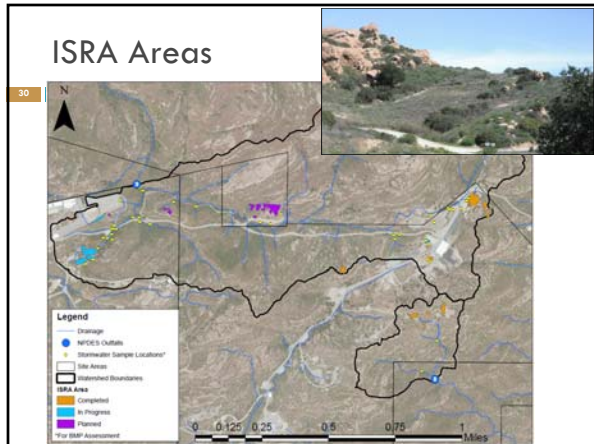
**Slope drains
and rock berms**

**Culvert outlet protection
(grouted rip rap)**












Lower Lot Biofilter





Plant growth progressing in the sediment basin



Electrical installation at the cistern area

Lower Lot Biofilter




NPDES Compliance Monitoring

- Six rain events so far this 2012/2013 season
- Season has been below normal for rainfall

Event Date	Nov 14 - 18	Nov 28 - Dec 4	Dec 12 - 18	Dec 22 - 26	Jan 23 - 27	Mar 7-8
Rainfall Total Depth (in)	0.99	1.49	0.68	1.13	1.78	0.87

- Outfall 009: 3 samples collected*, 1 result available, 0 exceedances
 - ▣ Last season: 9 samples collected, 4 exceedances (3x dioxin, 1x lead)
- Outfall 008: 0 samples collected*
 - ▣ Last season: 1 sample collected, 2 exceedances (1x copper and 1x lead)

*Auto-samplers collect flow when present. No sample collected if no flow.

