SANTA SUSANA FIELD LABORATORY

2021 PUBLIC MEETING
SITE-WIDE SUMMARY OF ACTIVITIES

August 19, 2021

SSFL Stormwater Expert Panel

With support from
Geosyntec consultants

Meeting Orientation

Meeting Objectives

- Provide opportunity for the Stormwater Expert Panel to provide an update on stormwater sampling results and management activities at SSFL, and respond to questions raised in a recent public survey
- Provide interested members of the public an opportunity to ask additional questions of the Stormwater Expert Panel

Agenda

4:00 – 5:15 pm	Panel Presentation
5:15 – 6:00 pm	Questions

Meeting Orientation

Proposed Ground Rules

- Please submit your questions to **all panelists** using the Q&A feature on Zoom
  - If unable to use Q&A feature please call 818-207-2196 to submit your questions for the expert panel
- We will answer your questions after the presentation
- Focus your questions on topics addressed by the Stormwater Expert Panel
- Please treat everyone in the meeting with kindness and respect

Outline

- Background and Panel Introduction
- Public Survey Responses
- SSFL Stormwater Overview
- Key Findings this Year
- Questions from the Public
- Summary

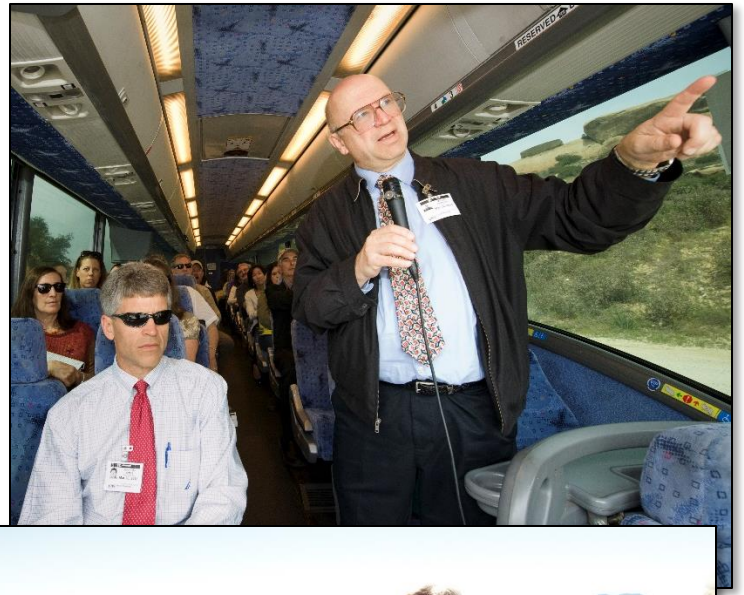
Background

Stormwater Expert Panel Introduction

- Dr. Bob Gearheart, PE, Humboldt State University
- Jon Jones, PE, Wright Water Engineers
- Dr. Michael Josselyn, WRA Consultants
- Dr. Bob Pitt, PE, University of Alabama
- Dr. Michael Stenstrom, PE, University of California, Los Angeles
- *Panel consultant: Geosyntec*

Panel's Ongoing Role and Scope

- Independent panel formed in response to the 2007 Cease and Desist Order from the RWQCB
  - *"…a panel to review site conditions, modeled flow, contaminants of concern, and evaluate the BMPs capable of providing the required treatment to meet the final effluent limits."*
- Ongoing Charge (2015 Permit)
  - Review NPDES compliance and BMP performance monitoring data
  - Investigate **site-wide** stormwater pollutant sources
  - Make recommendations for new BMPs or improvements to existing BMPs
  - Review Stormwater Human Health Risk Assessment (HHRA)
  - Public outreach

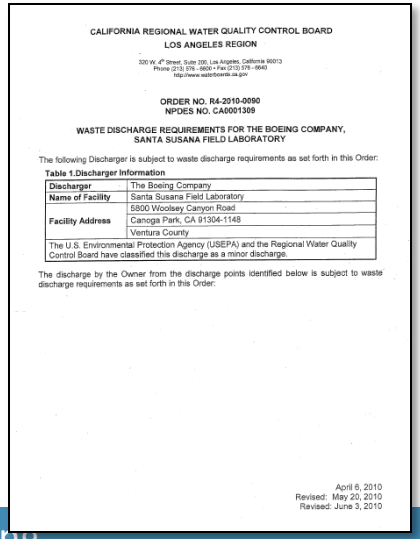


SSFL Overview

- Former rocket testing and energy research facility
- Industrial activities have ceased and facilities removal is underway
  - Nuclear energy research operations ceased in 1989
  - Rocket engine testing operations ended in 2006
- Current activities include environmental monitoring/sampling, remediation planning, and demolition
- Numerous stormwater Best Management Practices (BMPs) to treat stormwater from developed and undeveloped areas

NPDES Permit Overview

- Stormwater discharges at SSFL are regulated by the LARWQCB through an individual NPDES permit, which requires:
  - Composite sampling at 12 stormwater outfalls; and
  - Compliance with approximately 50 Numeric Effluent Limits (NELs) – protective of both human health and aquatic life
- NELs for a wide range of constituents, including:
  - Dioxins (TCDD TEQ): 0.000000028 µg/L (ppb)
  - Total Iron: 300 µg/L (ppb)
  - Total Lead: 5.2 µg/L (ppb)



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576 - 6600 • Fax (213) 576 - 6640
http://www.waterboards.ca.gov

ORDER NO. R4-2010-0090
NPDES NO. CA0001309

WASTE DISCHARGE REQUIREMENTS FOR THE BOEING COMPANY,
SANTA SUSANA FIELD LABORATORY

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1.Discharger Information

Discharger	The Boeing Company
Name of Facility	Santa Susana Field Laboratory
Facility Address	5800 Woolsey Canyon Road Canoga Park, CA 91304-1148 Ventura County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a minor discharge.	

The discharge by the Owner from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

April 6, 2010
Revised: May 20, 2010
Revised: June 3, 2010

Public Survey Responses

Public Survey Responses:

(1 indicating most and 4 indicating least interested)

Ranked interest in stormwater topics:

1. Description of existing structural stormwater control measures and treatment systems
2. Treatment performance of stormwater control measures
3. 2020/2021 season rainfall and monitoring summary
4. Lifecycle and maintenance of stormwater control measures

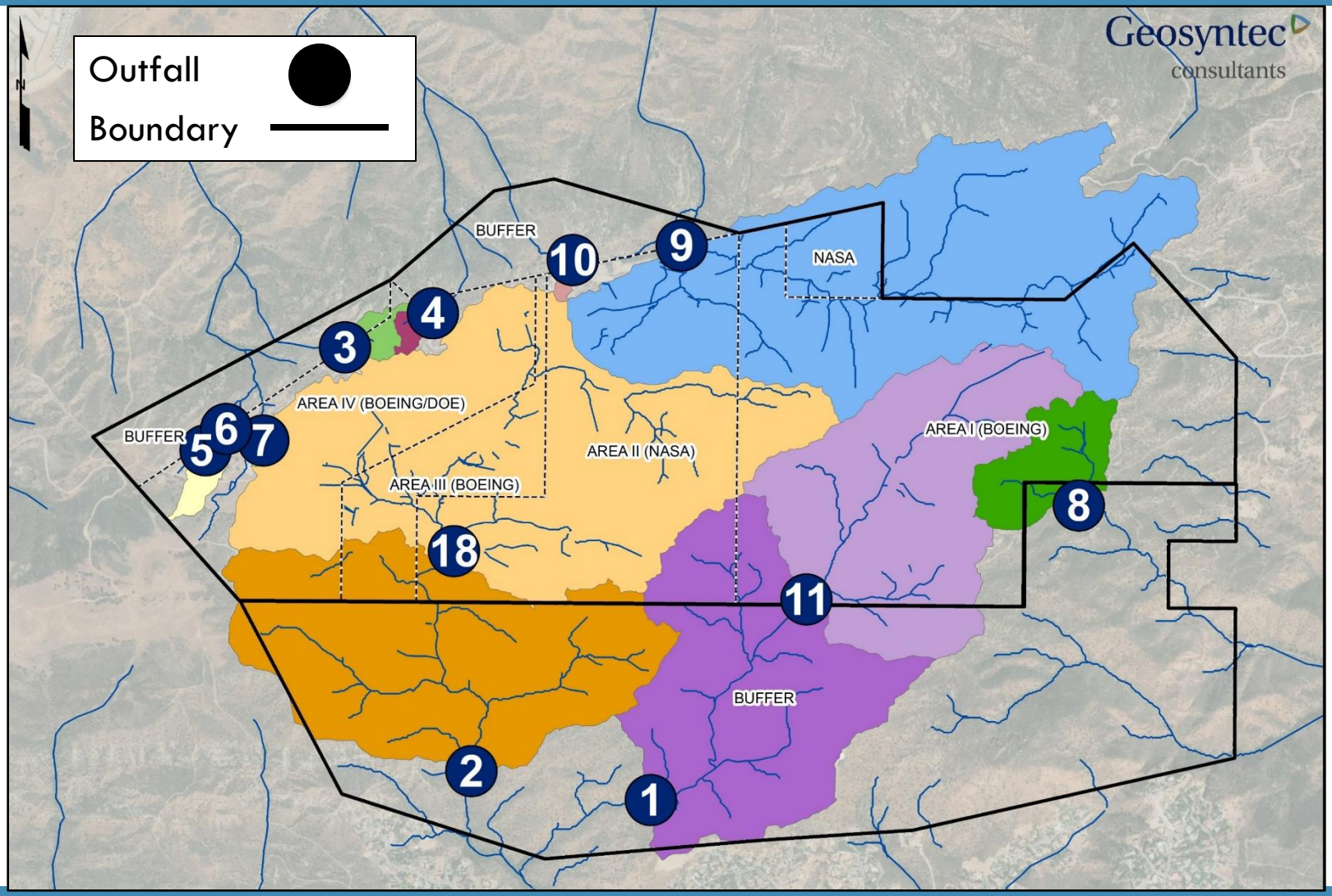
Ranked interest in areas of SSFL:

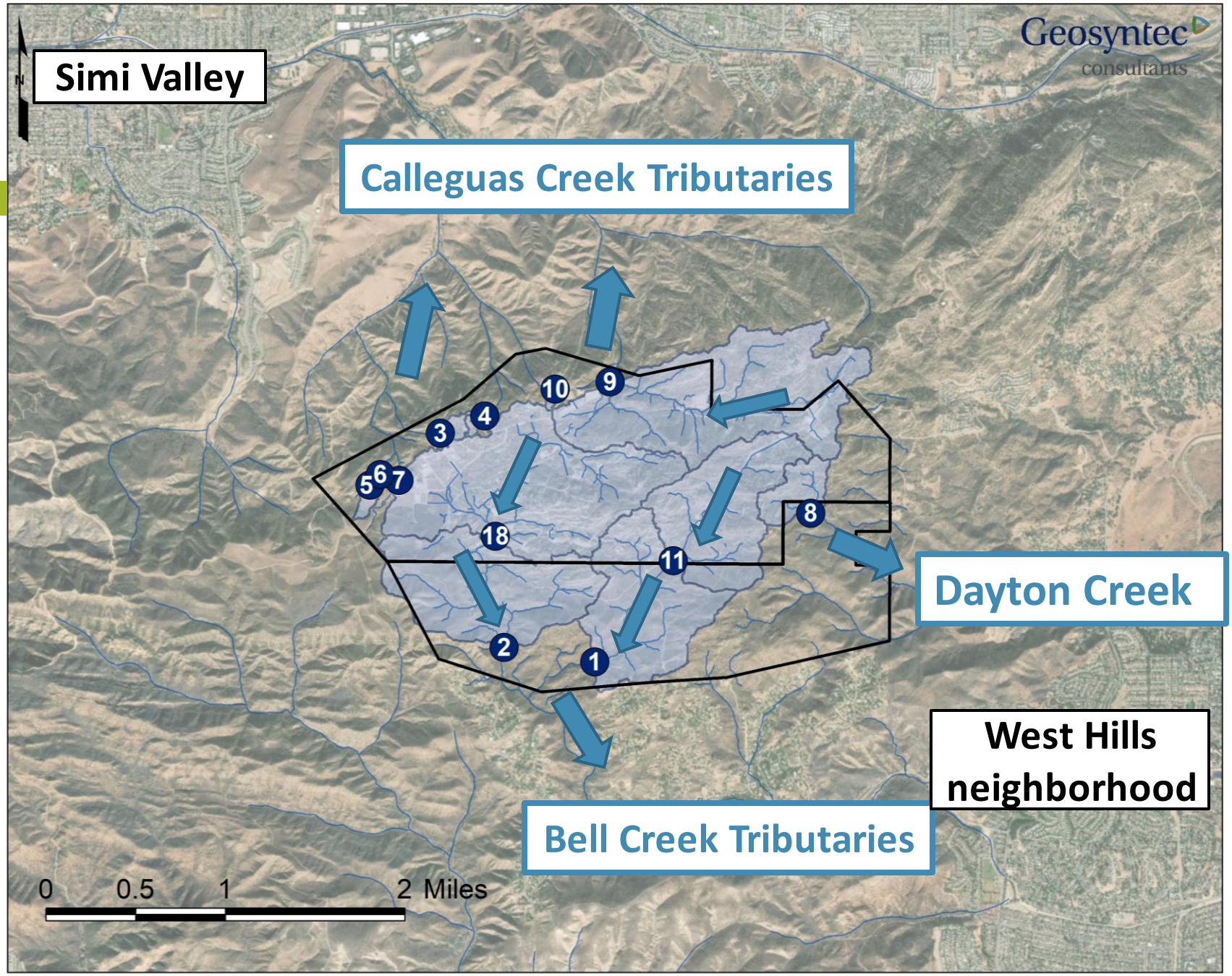
1. Southern buffer zone (Outfall 001 and 002 watersheds)
2. Happy Valley (Outfall 008 watershed)
3. Northern Drainage (Outfall 009 watershed)
4. Silvernale stormwater treatment system (Outfall 018)

Almost 20 questions were submitted which will be covered in later slides

SSFL Stormwater Overview

SSFL NPDES Outfalls




Simi Valley
Geosyntec consultants
Calleguas Creek Tributaries
10
9
4
3
5
6
7
18
8
11
2
1
Dayton Creek
West Hills neighborhood
Bell Creek Tributaries
0
0.5
1
2 Miles

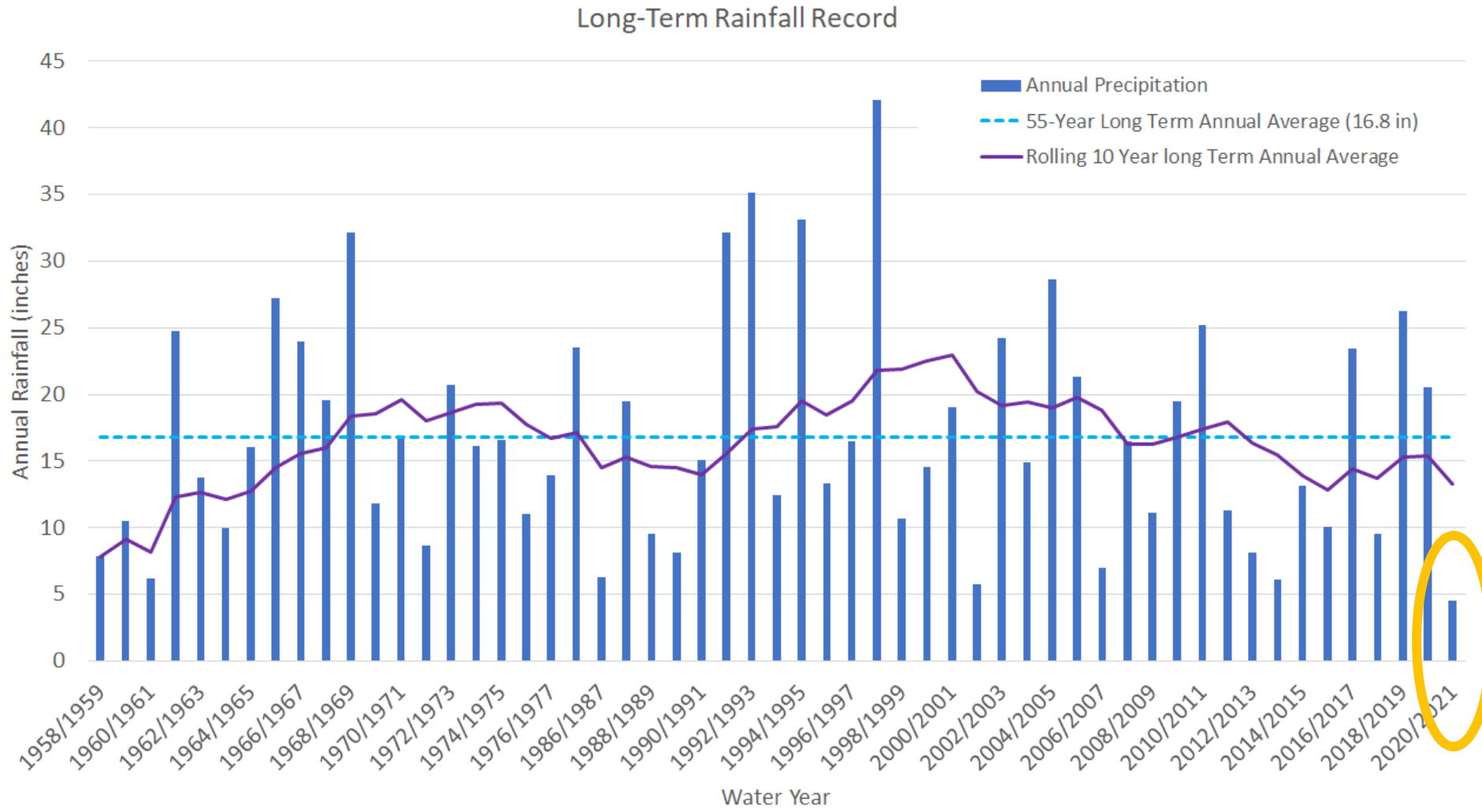
Key Findings This Year

#1: 2020/21 was an exceptionally dry year that did not produce any stormwater discharges from the site.

2020-21 was a drier than average year

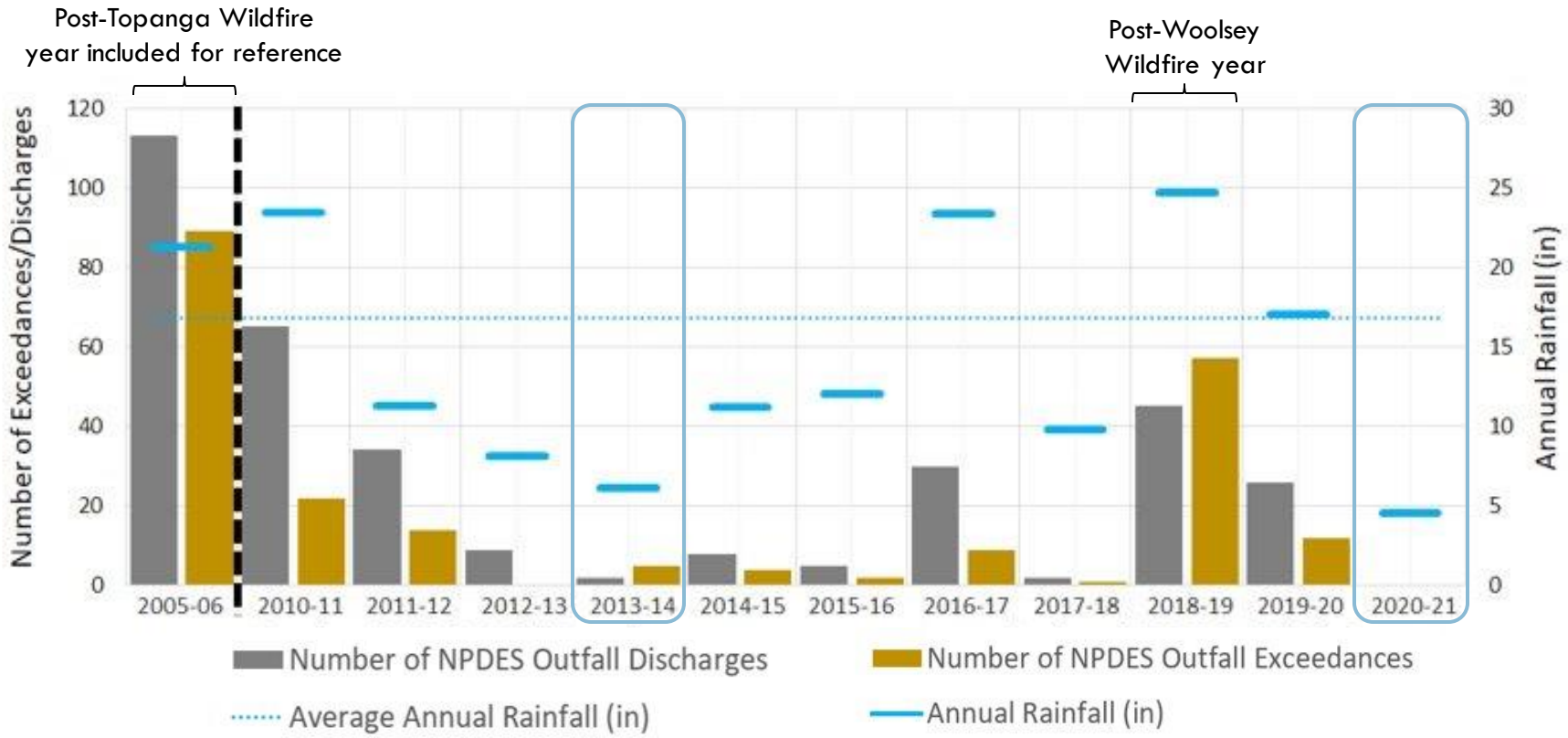
- Five qualifying rain events (greater than 0.10 inch in 24-hrs)
  - No stormwater discharged from the site
  - 14 BMP performance samples were collected (only in paved subareas)
- No storms were larger than the 24-hr 1-year recurrence interval storm (2.5-in)
- Total annual rainfall 4.52 inches (vs. 16.8 inch annual average)

Long Term Rainfall Record



Historical Overview – NPDES Sampling All SSFL Outfalls

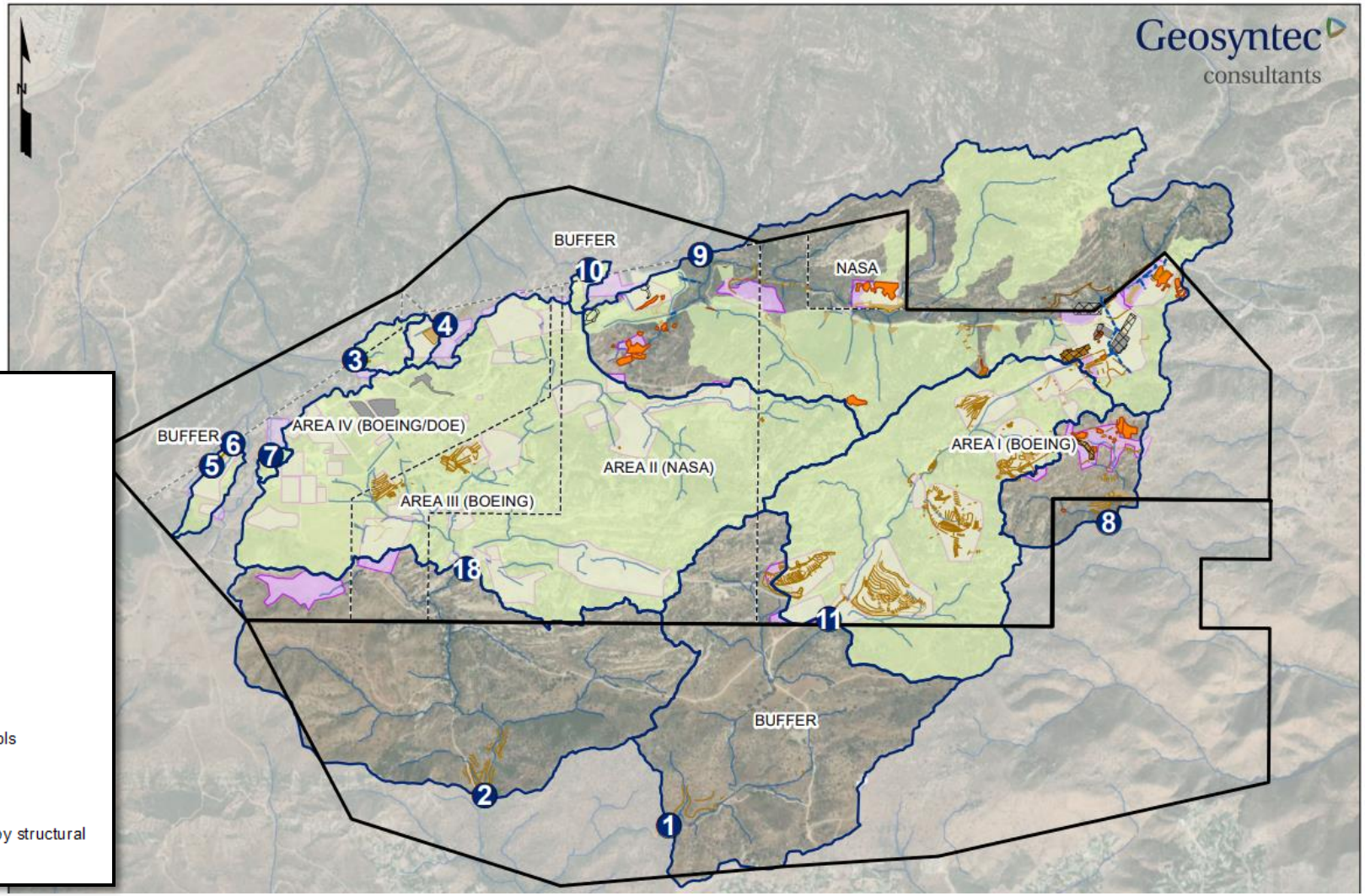
This year looks most similar to (but even drier than) 2013-14



Key Findings This Year

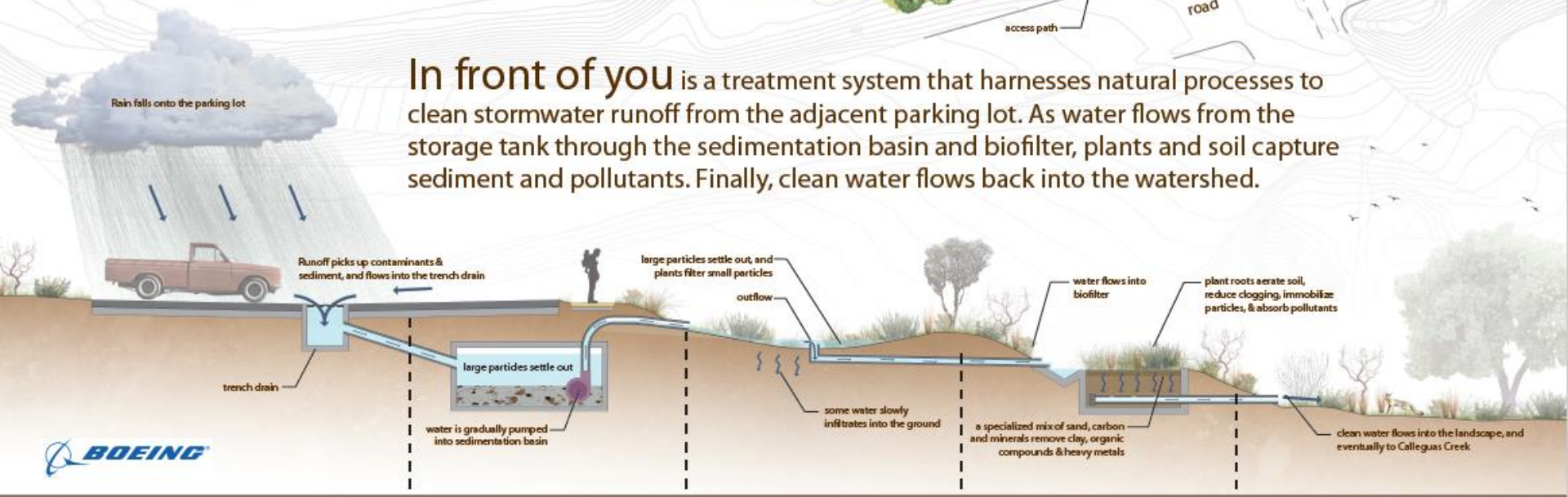
#2: The BMPs generally continue to be very effective

Structural treatment controls target RFI and other critical source areas



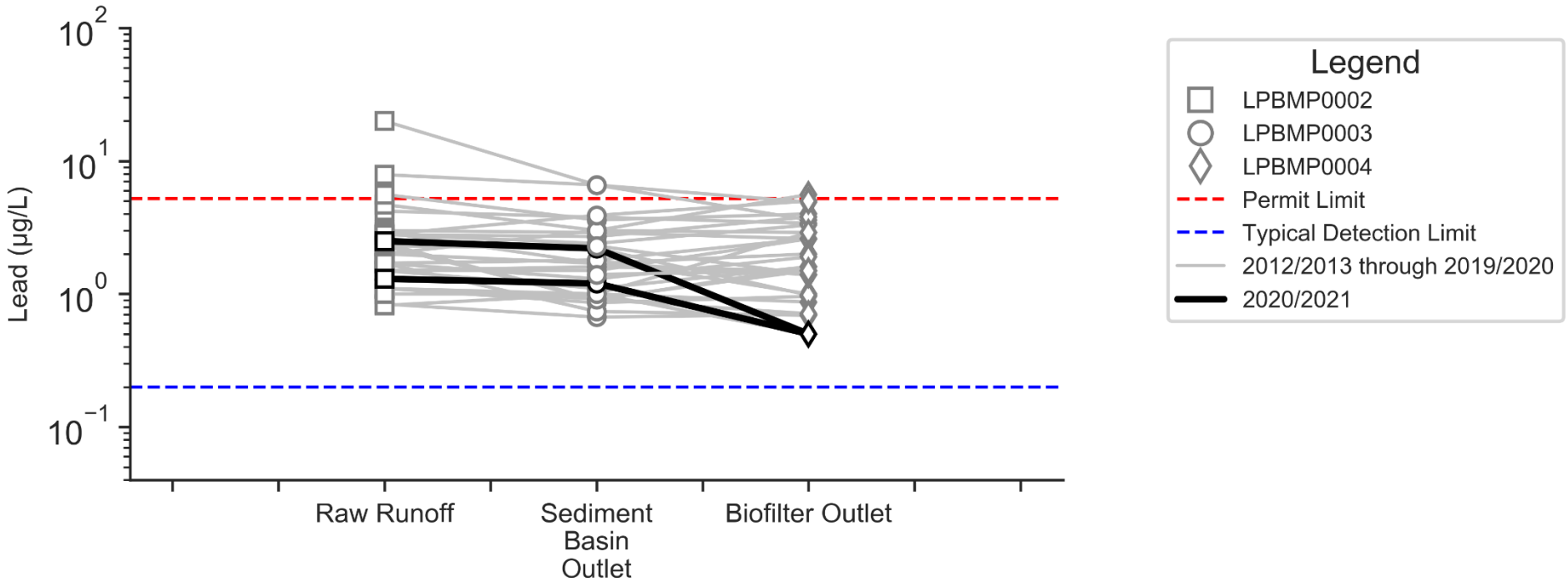
Cleaning Stormwater at the Santa Susana Field Laboratory

In front of you is a treatment system that harnesses natural processes to clean stormwater runoff from the adjacent parking lot. As water flows from the storage tank through the sedimentation basin and biofilter, plants and soil capture sediment and pollutants. Finally, clean water flows back into the watershed.

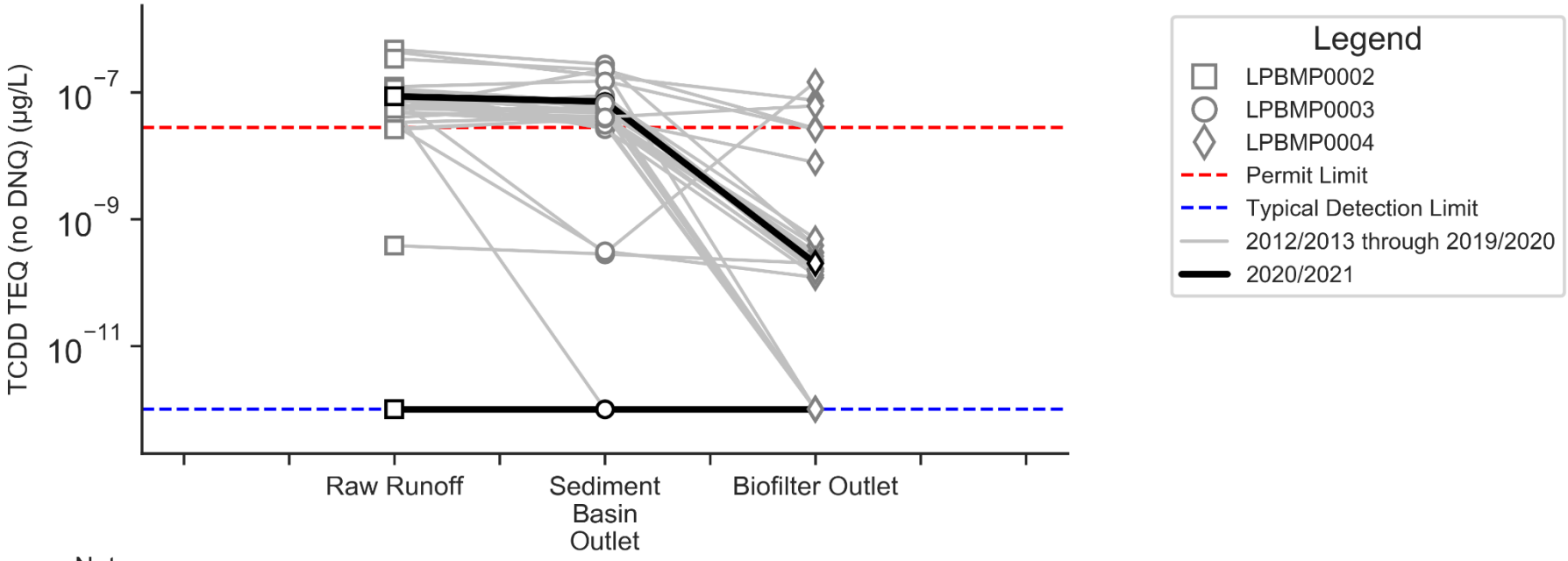


BP/JJ

009 Watershed BMP Performance Results (Biofilter Lead Example)



009 Watershed BMP Performance Results (Biofilter Dioxins Example)



Note:
- 1E-12 ug/L is shown for ND TEQ results as this is in the range of the lowest reported TEQ results with DNQ excluded.

Key Findings This Year

#3: Boeing and NASA continue to implement expert panel recommendations

Review of 2020 BMP Recommendations

Watershed	Recommendation	Status
Sitewide	Continue to review all Stormwater Pollution Prevention Plans (SWPPPs) for demolition and cleanup	Completed
Sitewide	Continue to monitor erosion and sediment controls and vegetation, repairing or supplementing where needed	Completed
Sitewide	Identify and evaluate the feasibility of removing unnecessary treated wood utility poles and other treated wood, and adjacent soils where staining is observed	On-going, will be evaluated again
001 & 002	Install non-flammable media wattles around the remaining bare treated wood utility poles in the Southern Buffer Zone	Installation complete, optimization on-going - Wattles should be spaced out from poles to better capture pole-impacted soils
001 & 002	Evaluate subarea monitoring data in OF001 and OF002 watersheds to identify any critical subwatersheds	On-going - No samples collected 2020/21 due to lack of runoff

Review of 2020 BMP Recommendations

Watershed	Recommendation	Status
009	Compare CM-3 performance before/after rebuild	On-going
009	Review ELV media filter design, inspect, and rebuild if necessary to reduce media washout	Rebuild in-progress
009	Remove sediment behind check dams in Northern Drainage, as needed	Evaluation in-progress
009	Evaluate admin area inlet filter performance	Completed - Recommended to remove
018	OF018/R-2A pond spillway media filter redesign/rebuild evaluation	In progress
001	Evaluate removal of pipe support stakes (potential iron source)	Completed - Removed stakes

Key Findings This Year

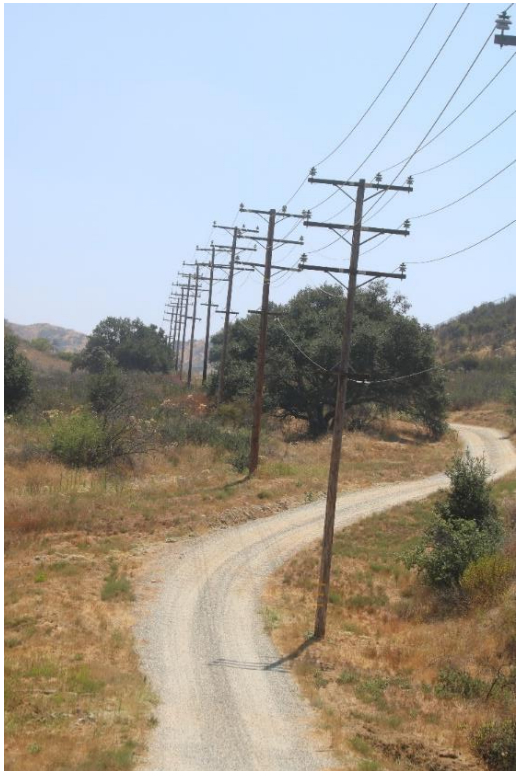
#4: Expert panel continues to evaluate potential sources of contaminants and recommends treatment as appropriate

Previous Stormwater Studies

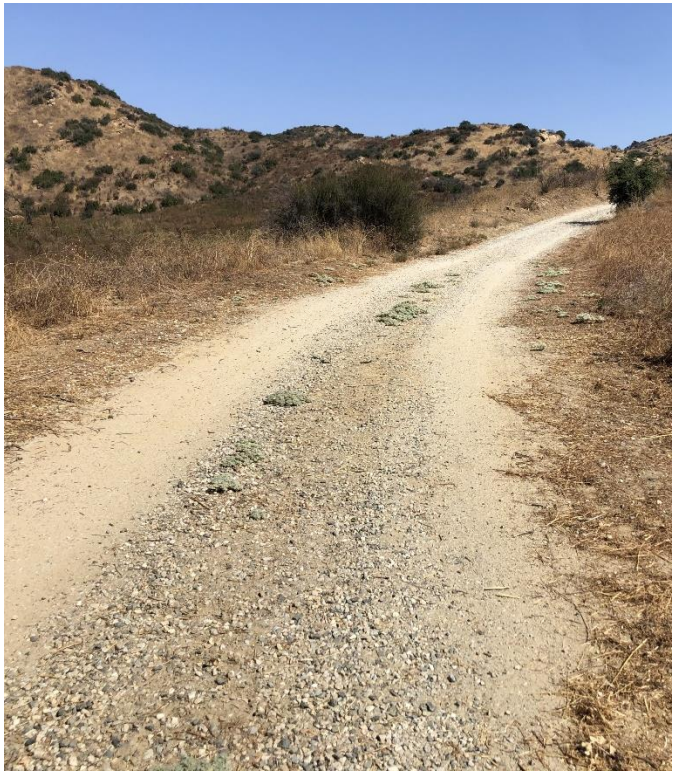
- Conducted extensive sampling throughout Outfall 008 and 009 to identify areas with impacted stormwater
- Ranked locations to prioritize targeting subareas for treatment
- From 2008-present distributed BMPs were designed and installed to treat stormwater from highest priority areas
- 2008 Interim Source Removal Action (ISRA) also removed surface soils high in NPDES exceeding parameters
  - 2010: Outfall 008 Excavations Completed
  - 2013: Outfall 009 Excavations Completed

Southern Buffer Zone
Potential Sources Sampled

Metal Stakes (evaluated for metals)
Stakes were later removed



Utility Poles (dioxin source)
Wattles later added



Gravel Roads (evaluated for metals)

Treated Wood Pole BMPs

Wattles added to approximately 115 Poles

Cleared bases at 88 Poles

Key Findings This Year

#5: Dry weather sampling of Bell Creek sampling

Bell Creek Dry Weather Sampling

Looking at Bell Creek and sampling point 12/23/2020

Close-up of Bell Creek on 12/23/2020

Bell Creek Dry Weather Sampling

- **Prompted in response to public questions and site visit**
- **Purpose:** to determine if septic effluent is contributing to flows along this reach, since significant algae was seen and this neighborhood is at least partly unsewered
  - Boeing and GWEP already have seep monitoring program, any dry weather flows at SSFL property boundary originate entirely from seeps or springs
- **What we did:** sampled surface water at downstream bridge during dry weather, and analyzed for chemical indicators of septic effluent
- **What we found:** based on a single sample, chemical signatures indicate no significant septic effluent contribution, and field observations also note dry weather urban runoff flows from irrigation overspray

Key Findings This Year

#6: The Annual Report will again make new BMP and monitoring recommendations

Preliminary Recommendations (Examples)

- Continue to monitor subareas in the Southern Buffer Zone to identify sources of exceedances at Outfalls 001 and 002
- Continue to monitor filter media BMPs for clogging potential before needing media replacement
- Continue to evaluate areas for erosion risk and add erosion controls as necessary
- Move treated wood utility pole BMPs (wattles, biobags) to better contain pole-impacted soils

Questions from the Public

Please submit your questions to **all panelists** using the Q&A feature on Zoom

If unable to use Q&A feature please call 818-207-2196 to submit your questions for the expert panel

Questions from Public

- Have any of these efforts worked?

EP Response: The Outfall 009 treatment controls continue to achieve a reduction in exceedances of lead and dioxins, which are two key NPDES parameters for the site.

BMP	Parameter	% of Samples Concentrations Above Permit Limits	
		Influent	Effluent
B-1 Media Filter	Lead	35%	8.7%
B-1 Media Filter	Dioxins	85%	68%
CM-1	Lead	31%	17%
CM-1	Dioxins	60%	48%
CM-9	Lead	41%	24%
CM-9	Dioxins	49%	22%
Upper Lot Media Filter	Lead	12%	0%
Upper Lot Media Filter	Dioxins	76%	50%
CM-3	Lead	40%	0%
CM-3	Dioxins	0%	0%
Lower Lot Biofilter	Lead	10%	3%
Lower Lot Biofilter	Dioxins	87%	9%
ELV Treatment BMP	Lead	17%	0%
ELV Treatment BMP	Dioxins	33%	13%
Detention Bioswales	Lead	38%	0%
Detention Bioswales	Dioxins	75%	14%

Questions from Public

- How effective will treatment systems be when a 100-yr storm hits SSFL?

EP Response: The treatment systems are not designed for a 100-yr storm event (7.76 inches in 24 hrs). The BMPs are sized wherever possible to a 1-year return interval storm, which was selected based on our analysis of the point at which increased sizing would provide marginal additional water quality benefit. This is a bigger "design storm" than is used in most stormwater NPDES permits across the state. Storms bigger than this receive partial treatment.

Questions from Public

- Impacts to habitat due to water treatment (and diversion)

EP Response: The Surface Water Expert Panel has not studied this specifically. Generally speaking, stormwater treatment improves water quality and habitat for aquatic life.

Prior to the implementation of treatment systems and diversion structures, the flows in channels and conveyances throughout the site were ephemeral and a constant flow of surface water was not present. Therefore, the introduction of treatment systems and diversion structures is not expected to change the ephemeral nature of discharges, but acts to slow down discharges, minimize erosion/scour, and improve the water quality of runoff conveyed throughout the site. Some discharges from the site may be prevented due to the introduction of diversion and storage ponds/tanks; however, the site has a history of infrequent precipitation and long antecedent dry periods, suggesting that any habitat established would be accustomed to infrequent wetting.

Stormwater from some areas within the site (helipad, northern outfalls) are diverted to a different drainage area for treatment, however these are very small compared to the overall flows from each drainage.

Questions from Public

- Any implications of dry weather to consider?

EP Response: During periods of drought, little to no stormwater runoff is produced on site, resulting in fewer discharges at the NPDES Outfalls, and fewer exceedances. Extended dry weather may increase risk of wildfire.

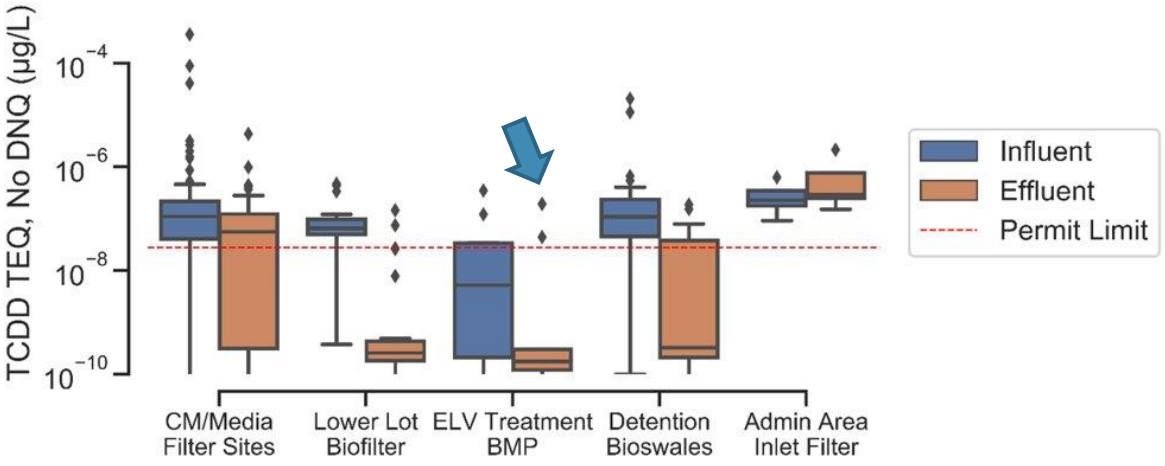
- Will the panel address the impact of the Woolsey Fire on water quality at the SSFL?

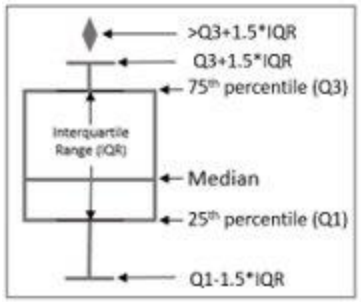
EP Response: While there were many NPDES exceedances in the first year after the fire, we found that water quality was restored to near pre-fire levels during the 2nd rainy season after the Woolsey Fire. A similar increase in stormwater concentrations was observed after wildfires in other natural watersheds (ie Station Fire). This is discussed in the 2020 public presentation.

Public Meeting Slides:
https://www.boeing.com/principles/environment/santa-susana/technical-reports.page

Questions from Public

- Re: 2020 presentation slide 28/50. Have the relatively high concentrations of Dioxins within the ELV area been investigated ?
- EP Response: It is suspected that the higher effluent concentrations were due to media being lost from the ELV BMP and maintenance was needed, so the media filter was reconstructed in July-August 2021. Monitoring results from the upcoming winter season will be used to evaluate if the replacement improved conditions and that the BMP is performing as expected.





Questions from Public

- What efforts have been made over the past year to isolate /remove known or potential sources of stormwater contaminants ?

EP Response: Metal stakes were removed throughout Outfall 001 watershed and new utility poles brought into the site are made of fiberglass. BMPs have been placed around all accessible utility poles in the southern buffer zone to minimize mobilization of dioxins from the wood treatment chemicals. Additionally, erosion control BMPs were maintained and are holding soils in place, and we've found natural soils to contribute significantly to NPDES exceedances at SSFL. DTSC dictates soil clean up areas, standards, and timing.

Questions from Public

- Has the expert panel investigated the use of isotopic analysis to determine the source of Fe and Mn?

EP Response: Isotopic analysis is underway to determine potential sources of lead in Outfall 009 watershed. Isotopic analysis was not pursued for Fe and Mn due to the weight of evidence supporting background soils as the most likely source of Fe and Mn in stormwater. See the 2018/19 and 2019/20 Site-Wide Stormwater Annual Report, in particular the source analysis appendix, for more information. Additionally, the Fe and Mn limits in the permit are secondary MCLs for drinking water (aesthetics for taste and odor).

Site-Wide Stormwater Annual Reports:
https://www.boeing.com/principles/environment/santa-susana/technical-reports.page

Questions from Public

- How will accumulative fallout from storm water run off be monitored?

EP Response: Erosion and sediment control methods reducing sediment transport to drainages have been employed in previous demolition and clean-up projects like ISRA. Drainage sediments have been sampled and drainage sediments, like soils, are under the jurisdiction of DTSC.

Questions from Public

- I would like to know more about the Silvernale system and how it relates to the GETS and how the damage from the Woolsey Fire impacted these systems

EP Response: Stormwater from the northern areas of the site and the Outfall 018 watershed is transferred to the Silvernale and R-2A ponds before being treated and discharged through the Silvernale stormwater conveyance and treatment system (SWTS), which discharges at Outfall 018. The fire didn't affect the Silvernale treatment system ability to operate. Stormwater conveyance pipelines and power were damaged by the fire, but were repaired and replaced prior to the first storm event. The flow-through media filter that is used to treat occasional overflows was destroyed and a replacement is currently being planned.

The Groundwater Extraction and Treatment System (GETS) is a completely separate treatment system and unrelated to Silvernale. GETS treats groundwater while Silvernale treats stormwater.

Questions from Public

- In layman terms how contaminated are the water tables in the SSFL area. And how long will it take get the contaminated water tables clean and safe?

The Surface Water Expert Panel's charge is to oversee and recommend strategies to maintain compliance with surface water regulations at SSFL. They are not responsible for evaluating groundwater contamination as there is a separate Groundwater Expert Panel charged with overseeing groundwater regulatory compliance. This question has been passed along to the Groundwater Expert Panel.

Questions from Public

- Outfall flow data
- What verifiable discharges of any significant contamination in recent years exist?

EP Response: Flow monitoring and stormwater discharge samples are collected at the NPDES Outfalls. The water quality of each sample collected is reported and discussed in the quarterly Discharge Monitoring Reports and in the Site-Wide Stormwater Annual Reports. There were no stormwater discharges at any of the NPDES Outfall locations at SSFL in the 2020/2021 winter season. After the Woolsey Wildfire there were higher concentrations detected at NPDES Outfalls during the 2018/2019 season, but in the following 2019/2020 season concentrations returned to lower pre-fire conditions.

Discharge Monitoring Reports:
https://www.boeing.com/principles/environment/santa-susana/monitoring-reports.page
Site-Wide Stormwater Annual Reports:
https://www.boeing.com/principles/environment/santa-susana/technical-reports.page

Questions from Public

- Human Health Risk assessment for those who did not hear the presentation about 2 years ago. Offsite risks from storm water.
- Have you identified any health issues in neighboring communities caused by Stormwater drainage.
- I would be interested in discussions related to offsite risks.

EP Response: The stormwater Human Health Risk Assessment (HHRA) found very low health risks from exposure to SSFL stormwater based on stormwater conditions present 2009-2016. It was reviewed and approved by the state. See the 2016 HHRA report for more information

Stormwater HHRA:
https://www.waterboards.ca.gov/losangeles/public_notices/Boeing/2017/16.FinalHHRAforSurfaceWaterRunoffExitingSSFLviatheSouthernOutfalls-October30,20017.pdf

Questions from Public

- How do the observed water discharges from the SSFL site compare to the local drinking water standards? Can this information be included in the annual report?

EP Response: This year there were no discharges, but in 2019/2020 there were no exceedances of human health-based drinking water standards.

- Please discuss the origins (institutional, philosophical, and practical) of the permit standards to be met and that they may or may not represent indicators of either ecological or human health when met or missed.

EP Response: All permit limits and benchmarks are based on the **most stringent criteria** for the protection of human health, aquatic life, and drinking water aesthetics. The permit limits are set by the Regional Water Quality Control Board. The permit fact sheet contains details about the basis of each permit limit.

Questions from Public

The permit fact sheet contains details about the basis of each permit limit

In each case the most stringent criteria for the protection of human health, aquatic life, and drinking water aesthetics was selected

Table F-5a. Applicable Water Quality Criteria

CTR No.	Constituent	Selected Criteria µg/L	CTR/NTR Water Quality Criteria: Freshwater Acute µg/L	Freshwater Chronic µg/L	Saltwater Acute µg/L	Saltwater Chronic µg/L	Human Health for Consumption of: Water & Organisms µg/L	Human Health for Consumption of: Organisms only µg/L	Drinking Water Standards: Primary MCL µg/L
1	Antimony	6[1]	--	--				4,300	6
2	Arsenic	10[2]	340	150				--	10
3	Beryllium	4[1]	--	--				--	4
4	Cadmium	2.5	4.5	2.5				--	5
14	Cyanide	5.2	22	5.2	N/A		N/A	220,000	150
16	2,3,7,8-TCDD	1.4E-08	--	--				1.4E-08	3.0E-05
7	Lead	3.2	82	3.2				--	15*
8	Mercury	0.051	--	--				0.051	2

*15 ug/L Action Level under lead and copper rule, not an MCL

Summary

1. 2020/21 was an exceptionally dry year that did not produce any stormwater discharges from the site
2. The BMPs generally continue to be very effective
   - Optimization continues
3. Boeing and NASA continue to implement expert panel BMP recommendations
4. Expert panel continues to evaluate stormwater runoff data and recommends control improvements as appropriate
5. This year's Annual Report will again include new BMP and monitoring recommendations

Questions

Please submit your questions to **all panelists** using the Q&A feature on Zoom

If unable to use Q&A feature please call 818-207-2196

to submit your questions for the expert panel

THANK YOU

Additional Information (e.g., Annual Report, Panel Presentations, NPDES Permit, and Technical Reports):
www.boeing.com/principles/environment/santa-susana

EXTRA SLIDES

Questions from Public

- Why don't you collect stormwater samples from SSFL that go past Black Canyon residences?

EP Response: Black Canyon residences are in a drainage area separate from SSFL activities. No stormwater runoff from SSFL passes directly through Black Canyon.