NASA COMMUNITY INFORMATIONAL UPDATE ON THE
ENVIRONMENTAL IMPACT STATEMENT
SANTA SUSANA FIELD LAB (SSFL)

6:00   Doors Open; Sign-in and Review Displays/handouts; Talk with NASA experts

6:45   Welcome, Introductions (Fellows)

          Facilitator (Santos)

          Amy Keith – General EIS process; next steps; timeline

          Allen Elliott – How Impacts are Assessed

          Jason Glasgow – Potential Remediation Technologies

7:45   Facilitated Questions and Answers on presentations and Review Displays

8:30   Meeting ends
Welcome to the NASA Information Meeting

Santa Susana Field Laboratory
National Environmental Policy Act
Environmental Impact Statement

Amy Keith, NASA EIS Project Manager
EIS Process

NASA Proposes Cleanup and Demolition

Notice of Intent (NOI)
Published July 6
Describe Action
Describe Scoping
Introduce Contacts

Scoping
Participate with other agencies and the public
Official Comment Period –Sept. 17

Environmental Analysis
Biological Survey
Archeological Survey
Wetlands Delineation
Air, Transportation, Other Studies

Prepare Draft EIS

Review Draft EIS
Notice of Availability (NOA)
Comment Period
Public Meeting

Record of Decision (ROD)

Prepare Final EIS

Prepare Draft EIS
NASA’s Environmental Impact Statement (EIS) Process
Basic Elements Within an EIS

- Proposed Action
- Environmental Resources
- Evaluate potential Impacts
Basic Elements Within an EIS

Proposed Action

Environmental Resources

Evaluate potential Impacts
Proposed Action and Alternatives

• Proposed Action—Demolition, Soil Cleanup to Background Levels, Groundwater Cleanup
• Alternative 1—Demolition, Soil Cleanup to Suburban Residential Cleanup Goals, Groundwater Cleanup
• Alternative 2—Demolition, Soil Cleanup to Commercial/Industrial Cleanup Goals, Groundwater Cleanup
• Alternative 3—Demolition, Soil Cleanup to Recreational Cleanup Goals, Groundwater Cleanup
• No Action Alternative
Technical Approaches Being Considered

**Soil Cleanup**

1. Excavation and offsite disposal
2. Excavation, onsite landfilling, and encapsulation
3. Soil vapor extraction
4. Ex situ treatment using land farming
5. Ex situ treatment using thermal desorption
6. In situ physical treatment using soil mixing
7. In situ chemical oxidation or reduction
8. In situ anaerobic or aerobic biological treatment
9. Phytoremediation
10. Monitored natural attenuation

**Groundwater Cleanup**

1. Pump and treat
2. Vacuum extraction
3. Iron particle injection
4. Heat-driven extraction
5. In situ chemical oxidation
6. In situ enhanced bioremediation
7. Monitored natural attenuation
Cleanup Areas for Background
What is the basis for the cleanup areas?

• Same as Preliminary Remediation Areas (PRAs) from the Field Sampling Plans
  – Analytical Data – Contaminant concentration levels from field sampling
  – Comparison values – Latest laboratory reporting limits (RLs) or 2005 background data for proposed alternative; respective risk calculations from the Draft Remedial Investigation (RI) Reports for Alternatives 1, 2, and 3

• Compare Analytical Data to Comparison Values

• Produce a Map Showing Areas
Cleanup Areas for Background

Undeveloped area

Total Sizes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres</td>
<td>85</td>
</tr>
<tr>
<td>Cubic Yards</td>
<td>502K</td>
</tr>
</tbody>
</table>
Cleanup Areas for Suburban Residential (Alt 1)

Total Sizes
- Acres: 18
- Cubic Yards: 182K
Cleanup Areas for Industrial (Alt 2)

Total Sizes
- Acres: 10
- Cubic Yards: 92K
Cleanup Area for Recreational (Alt 3)

Undeveloped area

Total Sizes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres</td>
<td>6</td>
</tr>
<tr>
<td>Cubic Yards</td>
<td>58K</td>
</tr>
</tbody>
</table>
Basic Elements Within an EIS

- **Proposed Action**
- **Environmental Resources**
- **Evaluate potential Impacts**
List of Resources to Evaluate

NEPA requires federal agencies to consider environmental effects that include, among others, impacts on social, cultural, and economic resources, as well as natural resources.

- Air Quality
- Biological Resources
- Cultural, Historic, and Archaeological
- Environmental Justice
- Geological Resources
- Greenhouse Gas
- Hazardous Materials / Hazardous Waste
- Health and Safety
- Infrastructure and Utilities
- Land Use
- Noise
- Paleontology
- Socioeconomics
- Transportation
- Water Resources
Historic Properties on Area II

Two Historic/Structural surveys were performed in 2007 and 2009

- 3 historic districts identified
  - 9 structures found individually ‘eligible’ for the National Register of Historic Places (NRHP)
  - 27 structures considered ‘contributing’ to the historic districts
Alfa District
Bravo District
Coca District
Conceptual Thinking on Building Demolition Selection

1. Is contamination around structure?
   - Yes: In coordination with DTSC, can cleanup goals be met without demo?
     - Yes: Yes
     - No: No
   - No: Building could be demolished

2. Is structure historic?
   - Yes: In coordination with SHPO, ACHP, and public, determine if structure should be saved
     - Yes: Can contamination be safely left in place?
       - Yes: Yes
       - No: No
     - No: Conduct demo and cleanup
   - No: Decide demo or not based on consultation with SHPO, ACHP, and public, and coordination with GSA

3. Can contamination be safely left in place?
   - Yes: Yes
   - No: No

4. If no demolition, conduct cleanup and maintain structure

5. If no demolition, conduct cleanup and maintain structure

6. If no demolition, conduct cleanup and maintain structure

7. If no demolition, conduct cleanup and maintain structure
Basic Elements Within an EIS

- Proposed Action
- Environmental Resources
- Evaluate potential Impacts
How impacts will be evaluated in the EIS

Example soil excavation
What is the Action?
## Biological Resource Facts

<table>
<thead>
<tr>
<th>Resource</th>
<th>Total Approx. Acres</th>
<th>Acres Impacted</th>
<th>Alternative 1 (Residential)</th>
<th>Alternative 2 (Industrial)</th>
<th>Alternative 3 (Recreational)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Proposed Action (Background)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetlands a</td>
<td>3.2 ac</td>
<td>2.4 ac (78%)</td>
<td>1.0 ac (32%)</td>
<td>0.8 ac (25%)</td>
<td>0.7 ac (22%)</td>
</tr>
<tr>
<td>Venturan Coastal Sage Scrub b</td>
<td>95.4 ac</td>
<td>12.8 ac (13%)</td>
<td>1.7 ac (2%)</td>
<td>0.9 ac (1%)</td>
<td>0.5 ac (1%)</td>
</tr>
<tr>
<td>Southern Willow Scrub b</td>
<td>1.0 ac</td>
<td>0.8 ac (78%)</td>
<td>0.4 ac (35%)</td>
<td>0.2 ac (19%)</td>
<td>0.01 ac (1%)</td>
</tr>
</tbody>
</table>

a - Federal

b - State designated high-priority conservation natural habitats
### Evaluate potential Impacts

<table>
<thead>
<tr>
<th>Resource Activities Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
</tr>
<tr>
<td>• Increase in criteria pollutant emissions from both onsite and offsite activities including excavation or other ground disturbing activities, demolition, erosion, equipment exhaust, exhaust from crew commutes, and exhaust from heavy trucks used to haul materials and soils to the appropriate licensed waste disposal facilities.</td>
</tr>
<tr>
<td><strong>Water Resources</strong></td>
</tr>
<tr>
<td>• Effects on surface water and groundwater quality, hydrology, and infiltration from the various cleanup approaches, changes in surficial flow patterns as a result of broad excavation or removal of structures or paved surfaces.</td>
</tr>
<tr>
<td><strong>Traffic</strong></td>
</tr>
<tr>
<td>• Effects on roadway operations, road conditions, parking, and emergency access from heavy truck use within and accessing SSFL.</td>
</tr>
</tbody>
</table>
# Soil Hauling Estimates

Assuming Excavation and Offsite Disposal

<table>
<thead>
<tr>
<th>Proposed Action (Background)</th>
<th>Alternative 1 (Residential)</th>
<th>Alternative 2 (Industrial)</th>
<th>Alternative 3 (Recreational)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal Volume (cy)</td>
<td>502,000</td>
<td>182,000</td>
<td>92,000</td>
</tr>
<tr>
<td>Truck Capacity (cy/truck)</td>
<td>19 (~24 tons)</td>
<td>19 (~24 tons)</td>
<td>19 (~24 tons)</td>
</tr>
<tr>
<td>Truckloads Required</td>
<td>26,421</td>
<td>9,579</td>
<td>4,842</td>
</tr>
<tr>
<td>Frequency (trucks/day) a</td>
<td>(52) [12] {27}</td>
<td>(19) [12] {27}</td>
<td>(10) [12] {27}</td>
</tr>
<tr>
<td>Hauling Duration (months) a</td>
<td>(23) [100] {44}</td>
<td>(23) [36] {16}</td>
<td>(23) [18] {8}</td>
</tr>
</tbody>
</table>

a - ( ) denotes frequency needed to meet 2017 deadline  
[ ] denotes limits based on operational controls  
{ } is based on the working air conformity limits. Final calculations will be provided in the Draft EIS.
## NASA Impact Definitions

<table>
<thead>
<tr>
<th>Impact</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Impact</td>
<td>No impacts would be expected.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Impacts would not be expected to be measurable, or would be measurable but too small to cause any change in the environment.</td>
</tr>
<tr>
<td>Minor</td>
<td>Impacts would be measurable but within the capacity of the affected system to absorb the change.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Impacts would be measurable but within the capacity of the affected system to absorb the change; or the impacts could be compensated for with mitigation and resources so the impact would not be substantial.</td>
</tr>
<tr>
<td>Significant</td>
<td>Impacts would be measurable but not within the capacity of the affected system to absorb the change, and without major mitigation, could be severe and long lasting.</td>
</tr>
</tbody>
</table>

**Quality:**
- Beneficial - would have a positive effect on the physical, social, or cultural environment.
- Negative - would have an adverse effect on the physical, social, or cultural environment.

**Duration:**
- Short term – would occur only during the proposed demolition and immediate remediation period.
- Long term – would continue beyond the proposed demolition and immediate remediation period.

**Proximity:**
- Local – would occur within the NASA-administered property at SSFL.
- Regional – would occur outside the NASA-administered property at SSFL.
Cumulative Impacts?

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes the actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR Section 1508.7).

- Actions of a similar character, which could affect the same environmental resources as NASA proposed action such as Boeing and DOE cleanups and demolition
Mitigations

Mitigation includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.
National Aeronautics and Space Administration
NASA’s Environmental Impact Statement (EIS) – Remedial Technologies
Remedial Technology Selection and Evaluation Phases

- Phase 1 – Remedial technology feasibility screening evaluation used to select the technologies

- Phase 2 – National Environmental Policy Act (NEPA) evaluation of remedial technologies and their potential environmental impacts
What is the process for selecting remedial technologies to evaluate in the EIS?

- Step 1 – Develop a “universe” of technologies that can be used for site remediation
- Step 2 – Evaluate the contaminants requiring remediation and select applicable technologies from the “universe” list
- Step 3 – Evaluate the following for each technology selected in Step 2
  - Effectiveness
  - Implementability
  - Cost-effectiveness
Step 1 – Technology Universe Sources

• Engineering judgment and past experience at other facilities including NASA sites

• Public input during scoping

• Literature Search
  – Clu-in Website and Webinars
  – Federal Roundtable
  – Academia

• Boeing Site-specific Experience/Evaluations

• Ongoing Department of Energy Treatability Study Evaluations
Step 2 – Soil Technology Screen

Primary Contaminants

• Organics
  – VOCs (TCE)
  – SVOCs (including PAHs)
  – TPH
  – PCBs
  – Dioxins
  – Energetics

• Inorganic
  – Metals

Technologies Considered

• Organic / Inorganic Contaminants
  – Excavation & Disposal
  – Excavation, Onsite Landfilling, and Encapsulation
  – Phytoremediation
  – Monitored Natural Attenuation (MNA)
  – Institutional Controls

• Organic Contaminants
  – Soil Vapor Extraction (VOCs)
  – Ex-situ Treatment
    – Landfarming
    – Thermal Desorption
  – In-situ Treatment
    – Soil Mixing
    – Oxidation / Reduction
    – Biological Treatment
Step 2 – Groundwater Technology Screen

Primary Contaminants

• Organics
  – VOCs

• Inorganic
  – Metals

Technologies Considered

• Organic / Inorganic Contaminants
  – Pump & Treat
  – Iron Particle Injection (primarily TCE)
  – MNA
  – Institutional Controls

• Organics Contaminants
  – Vacuum Extraction (VOCs)
  – In-situ Treatment
    – Heat Driven Extraction
    – Oxidation / Reduction
    – Biological Treatment
Step 3 – Effectiveness Technology Screen

- Ability to destroy contamination?

- Ability to reduce contamination to a non-toxic byproduct?

- Ability to reduce mobility of contamination?

- How long will the technology have to be implemented?

- Bedrock Constraints
  - Ability to reach contamination?
  - Bedrock fracture network?
  - Ability to deliver remedial technology to low permeability rock matrix?
Step 3 – Implementability Technology Screen

• Utilities / infrastructure available to support technology?

• Site-specific physical restrictions present (slopes / shallow bedrock / bedrock outcrops / depth to groundwater)?

• Most technology applications are implementable for soil or shallow groundwater; however, bedrock remediation technologies that are implementable are limited due to complex fault and fracture networks.

• Site-specific regulatory requirement considerations?
  – Air permitting
  – Water discharge permitting
  – Waste disposal
  – Other permits or notification
Step 3 – Cost-effectiveness Technology Screen

• Example Cost-effective Technologies
  – Enhanced bioremediation
  – In-situ chemical reduction
  – Phytoremediation
  – Landfarming
  – Monitored Natural Attenuation

• Example Costly Technologies
  – Excavation and Disposal
  – Thermal Technologies
  – Pump and Treat (GETS)
Soil Clean Up Technologies Selected for Evaluation

• Excavation and Offsite Disposal

• Excavation, Onsite Landfilling, and Encapsulation

• Soil Vapor Extraction

• Exsitu Treatment
  – Landfarming
  – Thermal Desorption (Rotary Dryer or similar technology)
Soil Clean Up Technologies Selected for Evaluation (continued)

• Insitu Treatment
  – Soil mixing (heat, ZVI, or oxidant)
  – Chemical Oxidation or Reduction (ZVI, H$_2$O$_2$, KMnO$_4$)
  – Biological Treatment (Anaerobic or Aerobic)

• Phytoremediation

• Monitored Natural Attenuation

• Institutional Controls
Excavation and Disposal
In-situ Treatment - Reduction
In-situ Treatment - Oxidation
In-situ Treatment - Soil Mixing
Groundwater Clean Up Technologies Selected for Evaluation

- Pump and Treat
- Vacuum Extraction
- Insitu Treatment
  - Iron Particle Injection
  - Chemical Oxidation (H₂O₂, KMnO₄)
  - Enhanced Bioremediation (Anaerobic or Aerobic)
- Heat Driven Extraction
- Monitored Natural Attenuation
- Institutional Controls
Heat Driven Extraction with Vacuum Extraction
Pump and Treat Groundwater
Remedial Technology Selection

• Multiple technologies may be implemented at same location (treatment train) on the basis of:

  – Contaminant mix present in soil or groundwater
  
  – Contaminant variation with depth (fate and transport of contaminants vary in subsurface)
  
  – VOCs migrating upward from groundwater into soil
  
  – Contaminant concentrations
NEPA Evaluation of Remedial Technologies

- NEPA evaluation of remedial technologies will include remedial technology environmental impact analysis for each resource area:
  - Land Use
  - Site Infrastructure
  - Cultural Resources
  - Biological Resources
  - Air Quality and Greenhouse Gas Emissions
  - Water Resources
  - Geologic and Paleontologic Resources
  - Hazardous Materials and Hazardous Waste
  - Health and Safety
  - Traffic and Transportation
  - Noise
  - Socioeconomics
  - Environmental Justice