2007 Western States Fire Mission

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NASA Dryden Flight Research Center
The NASA Dryden Flight Research Center
Ikhana Project Team and Ikhana
IKHANA

Ikhana Aircraft

Ground Control Station (GCS)

OTH KU Antenna
The Ikhana “Cockpit”
Pilot Displays for Situational Awareness

- IKHANA UAS / Ground Control Station (GCS)
- Ikhana UAS / Ground Control Station (GCS)
- Electronic Flight Bag Xm Wx
- IR Camera
- 45 Degree Camera
- Tracker Display
- Color Camera
- Falcon View Route
Mission Control and Research Workstations
Communications with Ikhana and ATC

- **LOS - C-band Command/Control (simplified)**
- **OTH - Ku band Command/Control (simplified)**

**ATC**

**Phone**
Science Partners

Operational Partners
IKHANA

Ikhana with the Fire Sensor Pod

NASA Ames Fire Sensor
FAA Certificate of Authorization (COA)

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COA Application Boundary
FAA Certificate of Authorization (COA)

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Population Keep-Out Zones (Pop KOZ)
FAA Certificate of Authorization (COA)

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“Backbone” Routes

Zone A
Route A

Zone B
Route B

Zone C
Route C
Contingency Planning – Primary ELSs
Contingency Planning – Secondary ELSs

Route Specific ELS Subset
FAA Certificate of Authorization (COA)

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Pilot ELS Information

038 Coyote Flats - USFS strip
Inyo County, CA

- 37° 12' 12.97" N
- 118° 28' 34.15" W
- FRD: BIH193012
- Zones: A, B
- Length: 3000 ft.
- Type: Dirt
- Elev: 10000 ft.

Sectional: None
Contact Info:
- None
- Inyo County Sheriff, Bishop
  - 12 Miles
  - Phone 760-873-7887
WX:
- BIH ASOS 125.25 13mi NE

Pilot Ranking: 3
Looks OK.
Mission Information

FAA Certificate of Authorization (COA)

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Flight Planning
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Approved COA Area

Special Provisions
WSFM 1  Aug. 16
4 Fires, 1400 nm, 9.5 hrs

WSFM 2  Aug. 29 – 30
7 Fires, 2500 nm, 16.1 hrs

WSFM 3  Sept. 7 – 8
12 Fires, 3200 nm, 20.0 hrs

WSFM 4  Sept. 27
BAER, 3 Fires, 1800 nm, 9.9 hrs
WSFM #2 2007

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New Detects from Overhead

3-D View

Castle Rock Fire Imagery
WSFM #3 2007

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Infrared Imagery
(hot spot)

Lick Fire Imagery

Back-Fire

Previously known fire perimeter

Active fire
New Research Configuration

WSFM 2007
Objectives Accomplished

Flexible Rubber Tape
WSFM 5
Oct. 24, 11 Fires,
~1350 nm, 9.0 hrs

WSFM 6
Oct. 25, 8 Fires,
~1350 nm, 7.8 hrs

WSFM 7
Oct. 26, 8 Fires,
~1350 nm, 7.8 hrs

WSFM 8
Oct. 28, 8 Fires,
~1350 nm, 7.1 hrs
WSFM #6 Emergency Response 2007

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Poomacha / Rice Fires – 3D with Hot Detects

Grass Valley / Slide Fires – 3D with Hot Detects
WSFM #7 Emergency Response 2007

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Santiago Fire – 3D with Hot Detects

Ranch Fire – 3D
WSFM #8 Emergency Response 2007

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Ranch, Ammo and Esperanza

BAER

Santiago Fire Detects

Ranch / Buckweede

BAER

Grass Valley / Slide

Housing

Bakersfield

IKHANA

San Diego

Riverside

San Antonio

Santa Ana

Esperanza '06

BAER

Ponchana

Rice

Witch

Buckbean

BAER
WSFM Achievements

**IKHANA**

<table>
<thead>
<tr>
<th>Flight Date</th>
<th>Flight Duration</th>
<th>Fires Flown</th>
<th>Mileage NM</th>
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<tbody>
<tr>
<td>WSFM 1</td>
<td>16 Aug</td>
<td>9.5 hrs</td>
<td>1400</td>
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<tr>
<td>WSFM 2</td>
<td>29 Aug</td>
<td>16.1</td>
<td>2500</td>
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<tr>
<td>WSFM 3</td>
<td>7 Sept</td>
<td>20</td>
<td>3200</td>
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<tr>
<td>WSFM 4</td>
<td>27 Sept</td>
<td>9.9</td>
<td>1800</td>
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<tr>
<td>WSFM 5</td>
<td>24 Oct</td>
<td>9</td>
<td>~1350</td>
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<tr>
<td>WSFM 6</td>
<td>25 Oct</td>
<td>8.7</td>
<td>~1350</td>
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<tr>
<td>WSFM 7</td>
<td>26 Oct</td>
<td>7.8</td>
<td>~1350</td>
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<tr>
<td>WSFM 8</td>
<td>28 Oct</td>
<td>7.1</td>
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WSFM Challenges

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Operational

Planning
WSFM Conclusions and Kudos

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