2007 Western States Fire Mission

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NASA Dryden Flight Research Center
Introduction

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

- Falcon View Route
- 45 Degree Camera
- IR Camera
- Tracker Display
- Color Camera
- Electronic Flight Bag XW
- Ikhana UAS / Ground Control Station (GCS)

NASA IKHANA
Ikhana UAS / Ground Control Station (GCS)

IKHANA

Mission Control and Research Workstations
Communications with Ikhana and ATC

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

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

**ATC**

Phone
Western States Fire Mission 2007 Partners

IKHANA

Science Partners

Operational Partners
Population Keep-Out Zones (Pop KOZ)
"Backbone" Routes

Zone A
Route A

Zone B
Route B

Zone C
Route C
IKHANA

Contingency Planning – Primary ELSs
FAA Certificate of Authorization (COA)

IKHANA

Contingency Planning – Secondary ELSs

Route Specific ELS Subset
FAA Certificate of Authorization (COA)

IKHANA

Pilot ELS Information

038 Coyote Flats - USFS strip
Inyo County, CA
- Sectional: None
- Contact Info: 
  - None
- Sheriff Info:
  - 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)

IKHANA

Mission phase

FL430
FL410
FL290
FL230

RVSM

Class A

Restricted airspace

18,000

Chase Aircraft required

Restricted airspace

Flight Planning
IKHANA
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
Active Fire

Zaca Fire Images

Unknown Fire

Changing Fire Perimeter

Coby Fire

Yosemite

Tar Fire

Zaca Fire
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)

Previously known fire perimeter

Active fire

Lick Fire Imagery

Back-Fire

EAA AirVenture 2008
WSFM #4 2007

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Burn Area Emergency Rehabilitation and Stabilization (BAER) Assessment Imagery
WSFM 2007 Objectives Accomplished

New Research Configuration

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 #5 Emergency Response 2007

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Harris Fire
Hot Detects

Ammo Fire
Hot Detects

Ranch / Buckweed
Magic
Grass Valley / Slide
Rosa
Poomacha
Rice
McCoy
Coronado Hills
Witch

6/3/2008
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, Ammo and Esperanza

BAER Grass Valley / Slide

Ranch/ Buckweed

BAER

Santiago Riverside

Esperanza ‘06

BAER

Ammo

Poemacha

Rice

Witch

Harms

Housing
### WSFM Achievements

#### IKHANA

<table>
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<th>Flight Date</th>
<th>Flight Duration</th>
<th>Fires Flown</th>
<th>Mileage NM</th>
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<tr>
<td>WSFM 1</td>
<td>16 Aug</td>
<td>9.5 hrs</td>
<td>1400</td>
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<tr>
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<td>29 Aug</td>
<td>16.1</td>
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<td>7 Sept</td>
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<td>27 Sept</td>
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<td>28 Oct</td>
<td>7.1</td>
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WSFM Challenges

IKHANA

Operational

Planning
WSFM Conclusions and Kudos

IKHANA