NSBF Overview

Balloon Working Group Meeting
Goddard Space Flight Center
June 30, 2003

Danny RJ Ball
Site Manager
National Scientific Balloon Facility
# Flight Summary

<table>
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<th>Flt #</th>
<th>P.I.</th>
<th>Date</th>
<th>Site</th>
<th>Science</th>
<th>Balloon</th>
<th>Payload Weight (lbs)</th>
<th>Flight Time (Hrs)</th>
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TIGER

- 3600 LBS
- 32 Days
- Altitude > 110 KFT
- Continuous TM and Command
- Payload 100% recovered
“Big 60”

- 59.84 mcf balloon conceived and built in 60 days
- .4 mil shell, 2 X .52 mil caps co-extruded Stratofilm 430
- 202 gores
- Gore Length - 750 feet
- Inflated Diameter - 534 ft
- Inflated Height - 429 ft
- Balloon Weight - 2751 lbs
- Seals - 28.7 miles
- Surface Area - 21 acres
- Flight Train Height at Launch - 1000 ft
- Nominal/Max Payload: 1200/1650 lbs
- Nominal Pressure Altitude: 158,400 ft
Flight # 508NT - World Record

- World record for largest balloon ever successfully launched
- Flight 508N/Evenson - launched Aug 26, 2002 from Canada
- Payload - 1546 lbs
- Flight time: 22 hours
- Float Altitude: 160,300 ft (geometric), 0.84 MB
Failures

- 1580PT, 517NT - ULDB Super Pressure balloons failed - Cathey/Gibson to address

- 510NT/Muller - Science failure

- 505N/Muller - 40 mcf - 3 cap balloon failure (leaker)

- 40 MCF Heavy Load History
  - 23 flights, 18 successful, 5 failures (78% success rate)
  - 11 suspended weight 7500-8000 lbs (LSI = 1553 psi) - 3 failures
  - 8 suspended weight 7000-7500 lbs (LSI = 1511 psi) - 2 failures
  - 4 suspended weight < 7000 lbs - no failures
  - Failures attributed to high gross inflation, launch stress index, folding, spool damage, and dynamic launch
Heavy Load Balloon Redesign

- **Redesign of 40 Heavy Balloon**
  - Reduce LSI to 1400 psi
  - 36.734 mcf vs current 39.57 mcf
  - Float Altitude 119.9 kft vs 122.5
  - Co-extruded 0.8 mil shell with 3 X 0.95 mil caps
  - Longer caps
  - Collar placed 10 feet lower than current practice

- **Spool Padding**
  - 40 Heavy test inflation and inspection showed damage
  - Padding will be added to spool
## Remaining FY’03 Flights (and FY’04 Antarctica)

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New Payloads

- Dr. Eun-Suk Seo - U. Maryland, Cosmic Ray, CREAM - ULDB
- Dr. Atlas - NOAA/NCAR, Atmospheric Science, Air Sampler, CWAS - Conventional
- Dr. Boggs - UC Berkeley, Nuclear Compton Telescope, High Energy, NCT - LDB
- SUNRISE Collaboration - NOAA, Max Planck, Spanish Space Agency, Solar - LDB
- Dr. Bianchini - ASI, Mars Lander Terminal Descent System Test - Conventional
- Dr. Rust - Johns Hopkins, Solar Physics, Solar Bolometric Imager, SBI - LDB
- Drs. Mitchell/Yamamoto - GSFC/KEK, Cosmic Ray, BESS Polar - LDB
- Dr. Devlin - Pennsylvania University, Microwave Background, BLAST - LDB
- Dr. Harrison - Caltech, High Energy Astrophysics, HEFT - LDB
- Dr. Christl, MSFC, Biophysics, Deep Space Test Bed, DSTB - LDB
- Dr. Kogut - GSFC, Microwave Background, ARCADE - LDB
- JPL - Mars Lander parachute tests - Conventional
- USAF - Nanosat Outreach Project - Conventional
- Dr. Ryan - U. New Hampshire, Megaball, Gamma Ray - Conventional
- Dr. Mlynczak - Langley, Atmospheric, FIRST - Conventional
“The Boss” - Antarctic Launch Vehicle

- Gross Vehicle Weight: 105,000 lbs
- Wheel Base Width: 12 ft, 5 in
- Total Vehicle Length: 50 ft, 4 in
- Engine: 460 horsepower Caterpillar diesel, 6 wheel drive, speed faster than advisable.
- Capability: 8000 lb payload, 15,000 lb gross inflation
- Pin Height: 36 feet
Engineering Development

- LDB TDRSS high gain antenna successfully tested - 50-150 Kbps

- LDB Iridium data modem successfully implemented - replaces INMARSAT and HF/ARGOS

- LDB LOS and OTH video compression capability for downlinking video

- New LDB PV cells selected - more durable at one half the cost

- New LDB charge controller implemented - more efficient, lower cost

- New LDB Pathfinder payload
Semi-Automatic Parachute Release (SAPR)

- Phase 2A testing completed – SAPR flown active with off line chute release squib.

- 12 successful flights during past year including 1 LDB flight in Antarctica. “Green Light” operational for night terminations.

- Report submitted to NASA/WFF

- Two live pure test flights planned this summer

- Goal is to implement SAPR for this year’s Antarctic campaign
Fort Sumner Facility Improvements

- 2 acres of asphalt added to launch area
- 300 degree launch finger
- Refurbishing Swedish crane for second launch vehicle
- Welding shop added
- Overhead hoist in old hangar
- Additional lighting
Upgraded Aircraft Support

- Two turboprops
- Two pilot crews
- All pilot labor subcontracted
- Universal telemetry seatpack
- Senior aircraft observer
- Electronics technician
New LDB Brazilian Launch Site

- Two potential sites identified
  - Araras - 22.3S, 47.3W
  - Bocubatu - 22.9S, 48.5W

- Both have launch area, hangars, and infrastructure to support LDB campaigns.

- Automatic weather stations being placed at both sites to assess which is best from a launch standpoint.

- Brazil to Australia mid-latitude LDB flights of 7-8 days
Safety, Reliability, and Quality Assurance

• S, R, & QA Manager hired June 2

• Norm Ennis
  – BS Aeronautical Engineering - Auburn, AA Electronic Technology, MBA nearly complete
  – 20 years experience as Quality Engineer and Manager
  – Member ASQE

• Reports directly to Site Manager
  – Responsible for creating and implementing a non-ISO quality system at NSBF covering all areas of activity including electronic, mechanical, balloons, operations, administration, and information technology.
  – Norm’s job will be to implement a credible, functional system without fundamental changes to the way NSBF does its job.
Suborbital Center of Excellence

- Funded through a grant from the Balloon Program Office
- Located at PSL/NMSU in Las Cruces
- COE charter is to promote education, research, outreach, and foster interest in Suborbital Programs in the secondary, undergraduate, and graduate educational communities.
- Formally dedicated in January 2002
- 12 Co-ops so far at Las Cruces, Wallops, and Palestine
- 2 open house days at Las Cruces for undergraduate and secondary students
Outreach

- ACES-Space Grant Workforce Development
- Marble Gauges
- American Horticultural Society
- Seattle High School Cosmic Ray Detector
New Balloon Contract

- PSL awarded contract effective April 1
- Four-year base contract
- Two three-year options
- Teaming with Raven, SWRI
- 35% of NSBF employees will qualify for PSL retirement benefits within 4 years (65% within the next 10 years).
NSBF Infrastructure Improvements
Shuttle Columbia Tragedy

- NSBF was Debris Collection Center.

- EPA, FEMA, National Forest Service, Coast Guard, FBI, American Red Cross, and seven government contractors operated out of NSBF between Feb and April.

- Up to 350 personnel located at NSBF. An additional 700 people in Palestine.

- NSBF supplied offices, power, Internet, supplies, security, garbage collection, and unlimited patience.
Tight Security!
No Respect!