Challenges of Integrated Testing & Training
at a Live Fire Sea Range
For 15th Annual ITEA TI Workshop
May 12, 2011

Jack Benzie
Technical Director
Discussion

• PMRF - Background
  • History
  • Mission & Vision Statement
  • Capabilities
  • Details on Training Mission
  • Details on Test & Evaluation Mission

• Unique Challenges as an Integrated Range
  • Alignment under COMPACFLT
  • Personnel and Asset Surge
  • WESTPAC Capability Expansion (Training Mission)
  • Funding and Charging Policies
  • Systems Sponsors, Sustainment, I&M
  • Scheduling

• Summary
### BRIEF HISTORY OF BARKING SANDS

<table>
<thead>
<tr>
<th>1920s &amp; 30s</th>
<th>1940s</th>
<th>1950s</th>
<th>1960s</th>
<th>1970 to Present</th>
</tr>
</thead>
</table>
| Kauai’s First Grass Airstrip | Mana Airport for Hawaiian and Pan American Airlines.  
- WWII brought in the military presence  
  - Heavy Military Traffic  
  - Base population 6-8,000 | Navy enters Joint Use Agreement with USAF (1956) | Bonham Air Force Base  
B-26 Light Bombers  
Significant expansion of mission, test sites, & capabilities  
- Today’s workforce (1000) consists of Military, Civil Service and Contractor | Navy becomes principle user with Training and Test & Evaluation |

**Southern Cross takes off on historic flight to Australia.** Originating from Oakland Airport, San Francisco, the whole distance, was later calculated as 7,389 miles (11890 km), 83 hours and 11 minutes.
PMRF’s Mission is to provide integrated range services in a modern, multi-threat, multi-dimensional environment, assuring safe conduct and evaluation of Force Readiness Events.

PMRF’s Vision is to Provide Premier Range services to meet present and future Warfighting requirements with clear and measurable benefits throughout the Pacific Theater.

Today's Testing Leads to Tomorrow's Training with Systems our Warfighters Must Have to Win in Combat
PMRF - “Home” to ~1000 Employees

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military (Officers/Enlisted)</td>
<td>60</td>
</tr>
<tr>
<td>Civilian (DOD)/ MWR (GS)</td>
<td>140</td>
</tr>
<tr>
<td>Contractors, Tenants, and MWR</td>
<td>800</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

- Over 50% of our workforce has called Kauai home for more than 5 years
- 95% of workforce reside in community
PMRF - Crossroad of the Pacific

- World’s Largest Underwater Instrumented Range
- Unconstrained by Geography
- Provides Complex/Realistic Scenarios
- Limited Encroachment
- Minimal Air Traffic/Sea Traffic
PMRF Range Complex

- Makaha Ridge
- Kauai Island
- Niihau Island
- Kaua Island
- Mauna Kapu
- Port Allen
- Kamokala Ridge
- Kokee Park
- Barking Sands
Joint / Combined Training Supporting
Force Readiness Continuum

- Anti-Submarine Warfare
- Anti-Air Warfare
- Anti-Surface Warfare
- Strike Warfare
- Electronic Combat
- Mine Warfare
- Naval Special Warfare
- Amphibious Warfare
- Rim of the Pacific (RIMPAC)
- Hollywood
- Remote Site Training Operations
PMRF Does . . . . .

Ordnance Storage
Range Clearance
Monitoring & Safety
Weapons Recovery
Optics
Telemetry
Precision Radar
Subsurface Exercise
Surface Targets
Aerial Targets
Training
OPFOR
RDT&E
Ballistic Missile Defense
Environmental Stewardship
Range Support
Range Clearance Monitoring & Safety
Weapons Recovery
Ordnance Storage
MDA - AEGIS BMD

- Began trials in 1997
- Live Missile Launches starting 1999
- Intercepts 2002 to present
  - 21 Hit to Kill Intercept Events
  - 46 Support Events
    - Low Altitude SM-2
    - High Altitude SM-3
    - RIMPAC
    - Japanese Cooperative Development
  - Next mission FTM-16 Event 3, Aug 2011

**BURNT FROST (Feb 08)**
- The USS LAKE ERIE fired a SM-3 into space at the malfunctioning satellite USA 193.
- The mission achieved the objective of destroying the satellite's hydrazine tank.
- The impact occurred at about 150 miles above the Pacific Ocean with an impact velocity of around 22,000 mph.
MDA - THAAD

- Moved to PMRF from White Sands Missile Range in 2006
- 1\textsuperscript{ST} Test at PMRF Jan 07
- 7 THAAD Interceptor Launches (6 missions) to date – All Successful
- Average 2 missions per year through 2009, now 1 annually
- Last Mission: FTT-14
  - Completed 28 June 2010
- Next Mission: FTT-12
  - Planned for Sep 2011
Aegis Ashore Footprint at PMRF

- THAAD Radar Site
- Range Operations
- THAAD Launch Area
- KTF
- MK-41 Launch Site
- Deckhouse
  - SPY-1D, Fire Control

- $68.10M
- Ongoing site survey & discussion
- Aggressive timeline
- 1st test Q1FY14
PMRF Alignment with Acquisition and Operational “Navy Readiness Enterprise Continuum”

**FUTURE READINESS**

- **CONCEPT & TECHNOLOGY DEVELOPMENT**
- **SYSTEM DEVELOPMENT & DEMONSTRATION**
- **PRODUCTION & DEPLOYMENT**

**CURRENT READINESS**

- **OPERATIONS & SUPPORT**

**ENTERPRISE FOCUS**

Integration of Functions and Processes

- **S & T**
- **Test & Evaluation Focus**
- **Fleet Training Focus**

**CORE FUNCTIONS & PROCESSES SUPPORT CUSTOMER BASE**

- Office of Naval Research (ONR)
- Naval Research Laboratory (NRL)
- Maritime Synthetic Range
- FORCEnet
- Advanced Airborne Test Facility
- Force Protection Battle Lab
- Laser/Optical System Integration
- Cooperative Engagement Capability
- ASAP X-Band Radar
- Directed Energy

**MDA Targets**

- Minuteman III
- Ground-Based Midcourse Defense
- Terminal High Altitude Area Defense

- Trident
- Standard Missile – 6
- Aegis BMD
- Aegis Ashore

**Basic/Intermediate/Advanced Training**

- Air/Surface/Subsurface Platforms
- Fleet Exercises
  - Rim of the Pacific
  - Hollywood
  - Pacific Blitz
- Disaster Response
- Combat System Ships Qualification Trials

- Remote Ops
  - Pohakuloa Training Area (PTA)
  - Guam
  - Okinawa
  - Maui

PMRF CONDUCTS OPERATIONS ACROSS THE ENTIRE NAVY READINESS ENTERPRISE
Alignment within Navy Command Structure

- Aligned under USFF and COMPACFLT along with other Navy Training Ranges
  - Not under SYSCOMs (NAVSEA, NAVAIR) as Navy Test Ranges
- Utilize Fleet Wide organizations and commands for Information Assurance (NETWARCOM), Frequency Management (NMSC), Contracts (NAVSUP/FISC)
- Fleet Training Requirements tend to be more stable and consistent, thus the supporting commands are not always familiar with the more flexible and changing requirements associated in testing
- Indirect benefit of enforcing some discipline with the test programs, minimizing short notice requirements creep
Range Utilization (Primary Operations)

- Utilization hours are for all hours of actual range use. If the range had 5 operations simultaneous from 8 a.m. - noon, this is considered a 4 hour range day. If the range had 1 operation from midnight to 2 a.m. and another from 8 a.m. - 4 p.m. this is a 10 hour day. Primary Operations Only. Activity type Other excluded. Available hours are from 0730 to 1600 daily excluding weekends, Holidays and Stand-down days.
- Colored bars represent % of total asset hours by activity type.
Personnel Surge & Asset Support from Other Ranges

- Since range manning is predominantly resourced to meet the more stable service and systems sustainment requirements associated with Fleet training, PMRF leverages use of personnel resources at other ranges and commands to support T&E
- Missile Defense Agency (MDA) Pacific Range Support Team (PRST) & Asset Tool Kit:
  - Surge personnel from NAWC Pt. Mugu, NAWC China Lake, WSMR & RTS for support in Safety (Flight & Ground), Overhead Surveillance, MK-74 Radar, and communications systems
  - Mobile Range Safety Assets to augment the PMRF MATSS - RTS KMRSS & NAWC Pt. Mugu RASA
  - NAWC P-3/C-130s, Honolulu based USCG C-130s, NRL P-3, NAVAIR Contract Aircraft to meet the long range surveillance and clearance requirements
  - NAWC China Lake Doppler Radar deployment to PMRF – Proof of Concept to meet Early Launch Tracking requirement for Safety to support upcoming dual interceptor THAAD mission (FTT-12) and Aegis Ashore (SM-3)
  - WSMR (NAVSEA Det) assist in sustainment & certification of the 50K launcher for BMD targets
- Benefit: reduce overall costs across the ranges for personnel resources by higher utilization of personnel & assets, thus minimizing excess capacity
- With more programs conducting tests requiring operations at multiple ranges (i.e. MDA, HTV, AHW), once schedules have been locked in, there have been minimal issues to deconflict use of surge personnel & assets
MULTISAIL: Large scale periodic Group Sail by WESTPAC FDNF units (surface & air) for training and proficiency; PMRF deploys a Portable Underwater Tracking Range (PUTR) off the coast of Japan for Anti-Submarine Warfare (ASW) events; commenced in 2005 at one event annually; expected to increase to twice annually in the near future due to increasing customer base

Guam range boat (TR-6) expanded support to include:
  – SUBEX
  – Supports control and deployment of surface target capability which PMRF stood up in 2010 to meet Navy helo crew recurring lasing proficiency and live fire qualifications

Okinawa EWEX (1-2 per year); commenced in 2009 - for USN and USMC aviation

Additional Notes:
  – Replacement boat for TR-6 (Range Training Support Craft) has an expected delivery date of 2014; will increase capability for targets, PUTR deployment, EW threat signals, longer range/higher sea state/extended duration
  – Plans to stand-up EW threat signal and aircraft tracking/scoring capability in Guam and Marianas Training Area for Naval Aviation are in progress
  – Philippines support USMC PHIBLEX 2009 & 2010 (Electronic Warfare)

Crawl, Walk, Run – surge philosophy being used until capability is demonstrated and matured for sustainment, and customer base warrants permanent presence
PMRF – Sustained Integrated Test and Training

PMRF is a Mission Funded Navy Training Range. Only DoD range that conducts business across the entire operational and acquisition continuum.

FY09 Execution

- ROS Reimbursable Support w/o MRTFB: 32%
- MRTFB Support: 4%
- ROS Fleet Training: 27%
- BOS: 36%
- Off-shore Contracts: 9%

FY08 Execution

- ROS Reimbursable Support w/o MRTFB: 23%
- MRTFB Support: 5%
- ROS Fleet Training: 27%
- BOS: 36%
- Off-shore Contracts: 9%

FY10 Execution

- ROS Reimbursable Support w/o MRTFB: 25%
- MRTFB Support: 6%
- ROS Fleet Training: 27%
- BOS: 32%
- Off-shore Contracts: 10%

PMRF IS CURRENTLY OPERATING AS AN INTEGRATED RANGE
Funding / Charging Policy

- **Multiple funding lines:**
  - Range Operations Sustainment (ROS) Institutional - Sustain range infrastructure & operations to meet Fleet Training requirements
  - MRTFB – Sustain capabilities that predominantly support RDT&E
    - 4 Capabilities at PMRF – Telemetry, Optics, Signature Radars, Mobile At-Sea Sensor (MATSS) System
  - Reimbursable – RDT&E programs
    - “Direct Charge” policy for use of both ROS Inst & MRTFB assets
    - 9 capabilities sponsored by MDA for sustainment to meet infrastructure (THAAD, Aegis BMD, C2BMC) and data collection requirements
      - Will increase with stand-up of Aegis Ashore testing
  - Base Operations Sustainment – Sustain base infrastructure and operations via CNIC

- **Challenges:**
  - With only 4 MRTFB capabilities, difficult to leverage I&M funding for upgrades to other critical systems (i.e. networks, communications, radars, etc.)
  - Fleet has limited funding for improvement and modernization of critical range systems
Funding the O&M Contract

Whose Bill is the white space below the line?

Surge capability
Overtime, Part-time

T&E Support Funded by Reimbursable RDT&E
(Direct Cost Only)

Fleet Training Support Funded by CPF (O&M)
Maintenance support for MRTFB assets (RDT&E)
Maintenance support for MDA assets (RDT&E)

Base Operations Support Funded by CNIC (O&M)

Contractor Staffing level

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
PMRF Major Sensors

PRECISION TRACKING RADAR (11-PMRF)
4 - MPS-25 ROSA (2 B/S, 1 Kokee Park, 1 M/R)
1 - FPS-16 (Kokee Park)
2 - FPQ-10 (2 M/R)
3 - DR-COSIP (2 M/R, 1 MATSS)
1 - MK-74, Mod-15 XDAS Guided Missile Fire Control System with Imaging (Kokee Park)

SURVEILLANCE RADAR (7-PMRF, 1-FAA, 1 HIANG)
1 - SPS-48E (M/R)
3 - APS-134V (M/R, Kokee Park, Niihau)
1 - SPS-67 (B/S)
1 - FPS-117 (HIANG) ¹
1 - APS-140 (C-26)
1 - ARSR-4 (Mt Kaala) ²

COMMAND & CONTROL
3 - Range Operation Control Centers
1 - Battle Management Interoperability Center
1 - Command & Control Processor (C2P) / CDLMS (Link 11 / Link 16 SATCOMM)

OPTICS
2 - Stabilized High-Accuracy Optical Tracking System (SHOTS) (1 B/S, 1 MATSS)
2 - Versatile Tracking Mounts (VTM) (1 B/S, 1 M/R)
12 - Launch Area Photographic System (LAPS) cameras (10 “Phantom 9” and 2 “Phantom 10” cameras)

TELEMETRY (8-PMRF, 1-NASA, 2-KTF, 2-USAF, 4-MRSS)
1 - GKR-8A (M/R)
3 - KAM 43’ (M/R)
4 -150-20’ (3 M/R, 1 Kokee Park) ³
1 - Unified “S” Band (Kokee Park) ⁴
1 - 15’ Autotracking System (KTF) ⁴
1 - 20’ Autotracking System (KTF) ⁴
1 - Dual-Helix P-band Array (KTF) ⁴
1 - 46’ Tracking System (USAF/Kaena Pt) ⁵
1 - 60’ Tracking System (USAF/Kaena Pt) ⁵
1 - 8’ Antenna (MRSS)
2 - 12’ Antennas (MRSS)
1 - 24’ Antenna (MRSS)

FLIGHT TERMINATION SYSTEM (5-PMRF, 2-KTF, 1-MRSS)
5 - Command Transmitter Sets (4 Kokee Park, 1 MRSS)
1 - Command Transmitter Set (KTF) ⁴
1 - Airborne FTS Relay Sets (C-26)

NOTES:
1 - HIANG (Hawaii Air National Guard), FAA
2 - FAA Asset
3 - NASA Asset
4 - DOE / SNL (Sandia National Lab) Asset
5 - DET2 SMC

Blue = MRTFB
Red = MDA
# PMRF Infrastructure Sponsors (FY 2010)

<table>
<thead>
<tr>
<th>Category</th>
<th>MRTFB</th>
<th>MDA</th>
<th>FLEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRTFB PAYS MGMT, ADMIN, MAINTENANCE</td>
<td>MRTFB PAYS MGMT, ADMIN, MAINTENANCE</td>
<td>MDA INFRASTRUCTURE COST</td>
<td>FLEET PAYS MGMT, ADMIN, MAINTENANCE AND FLEET OP COSTS OTHER CUSTOMERS PAY DIRECT OP COSTS</td>
</tr>
<tr>
<td>CUSTOMER PAYS DIRECT OP COSTS</td>
<td>CUSTOMER PAYS DIRECT OP COSTS</td>
<td>FLEET</td>
<td>(ASSETS LISTED BY PERCENTAGE OF T&amp;E UTILIZATION DERIVED FROM TOTAL ASSET UTILIZATION HOURS)</td>
</tr>
<tr>
<td>Q-4 WB COSIP</td>
<td>MOBILE RANGE SAFETY SYSTEM (MRSS)</td>
<td>T&amp;E CUSTOMER USAGE ≤ 50% OF TOTAL ASSET HOURS</td>
<td>%</td>
</tr>
<tr>
<td>Q-15 WB COSIP</td>
<td>TELEMETRY OPERATION SUPPORT ROOM (TOSR)</td>
<td>T&amp;E CUSTOMER USAGE ≥ 50% OF TOTAL ASSET HOURS</td>
<td>%</td>
</tr>
<tr>
<td>Q-16 MOBILE WB COSIP</td>
<td>DATA ANALYSIS CENTER (DAC)</td>
<td>BATTLE MGMT INTEROPERABILITY CENTER (BMIC)</td>
<td>100%</td>
</tr>
<tr>
<td>MK-74 RADAR</td>
<td>ROCC CONSOLE EXTENSION</td>
<td>RANGE DATA PRODUCTS GROUP (RDPG)</td>
<td>49%</td>
</tr>
<tr>
<td>TELEMETRY</td>
<td>C-BAND BAND SATELLITE EARTH STATION (SES)</td>
<td>GROUND/LAUNCH SUPT (ORD MAB)</td>
<td>100%</td>
</tr>
<tr>
<td>GKR-8A</td>
<td>LAUNCH AREA PHOTOGRAPHIC SYSTEM (LAPS)</td>
<td>REAL TIME COMPUTER CENTER (RTCC)</td>
<td>49%</td>
</tr>
<tr>
<td>43' KAM</td>
<td>TRANSLATED GPS RANGE SYSTEM (TGRS)</td>
<td>MISSILE ACCIDENT EMERGENCY TEAM (MAET)</td>
<td>100%</td>
</tr>
<tr>
<td>150-20</td>
<td>CLASSIFIED VIDEO DISTRIBUTION SYSTEM (CVDS)</td>
<td>MESSAGE CENTER</td>
<td>97%</td>
</tr>
<tr>
<td>SHOTS I &amp; II</td>
<td></td>
<td>FIC BARKING EMERGENCY TEAM (FIC)</td>
<td>97%</td>
</tr>
<tr>
<td>VTM I &amp; II</td>
<td></td>
<td>ORDNANCE SUPPORT (ORD)</td>
<td>91%</td>
</tr>
<tr>
<td>MATSS</td>
<td></td>
<td>COMM MAKAHA RIDGE</td>
<td>76%</td>
</tr>
<tr>
<td>MATSS COMM</td>
<td></td>
<td>INSTRUMENTATION CONTROL CENTER (ICC)</td>
<td>73%</td>
</tr>
<tr>
<td>MATSS VSAT</td>
<td></td>
<td>VIDEO SERVICES</td>
<td>70%</td>
</tr>
<tr>
<td>DOE/Sandia National Lab</td>
<td></td>
<td>I-NET</td>
<td>67%</td>
</tr>
<tr>
<td>AUTOTRACKING SYSTEMS</td>
<td>FPS-117</td>
<td>RANGE CONTRACTOR COORDINATORS (RCC)</td>
<td>66%</td>
</tr>
<tr>
<td>15' AUTOTRACKING SYSTEMS</td>
<td></td>
<td>COMM B/S</td>
<td>63%</td>
</tr>
<tr>
<td>20' AUTOTRACKING SYSTEMS</td>
<td></td>
<td>NTDS LINK 11/LINK 16</td>
<td>63%</td>
</tr>
<tr>
<td>DUAL-HELIX P-BAND ARRAY</td>
<td></td>
<td>COMM KOKEE</td>
<td>63%</td>
</tr>
<tr>
<td>COMMAND TRANSMITTER SET</td>
<td>COMMAND TRANSMITTER SET</td>
<td>RANGE CONTRACTOR COORDINATORS (RCC)</td>
<td>66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LARGE AREA TRACKING RANGE (LATR)</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RANGE SURVEILLANCE/RATC</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NCTS</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RANGE SURVEILLANCE/RATC</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WRB 101</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BUSINESS INFORMATION SYSTEM (BIS)</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAFETY CLUSTER</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPECTRE/DATA FUSION FORMERLY APIS</td>
<td>53%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNDERWATER TRACKING SYSTEM (UTS)</td>
<td>52%</td>
</tr>
</tbody>
</table>
• 1997-2005: Modernization of launchers, telemetry, optics, radars, and MATSS
  – Program Drivers: Aegis BMD

• 2005-2010: Range upgrades to radars, range safety systems, data systems and networks
  – Program Drivers: Aegis BMD and THAAD

• 2010-2015: Planned upgrades to telemetry, optics, radars, MATSS, range safety systems, MILCONs and transfer of KTF from DOE to DON
  – Program Drivers: Aegis BMD, THAAD, ARDEL, Aegis Ashore, Directed Energy, and LEONIDAS
**PMRF Data Transport Backbone**

**Background / Need**
- PMRF currently uses Asynchronous Transfer Mode (ATM) technology as the backbone for all data transport between Barking Sands, Makaha Ridge, Kokee, & MATSS; transports both classified and unclassified data
- ATM is a 1980s-developed technology; becoming obsolete and unsupportable
  - Equipment end-of-life 2012
  - No manufacturer support after 2012

**Programmatic Impact If Not Funded**
- By 2012, manufacturer support will stop, the current ATM equipment may not meet mission readiness and quality assurance goals

**Proposed Funding Arrangement**
- Cost sharing between Fleet, MDA, and MRTFB
- $8.5M Total Project Cost
  - FLEET --$3.0M
  - MDA --$3.0M
  - MRTFB -$2.4M
PMRF POM-12 Composition Review to OPNAV N43 (Navy Range Office) via COMPACFLT to include:

1. MPS-25 NB ROSA (4 each)
2. Source Integration Server (SIS)
3. Mobile Range Safety System (MRSS)
4. Launch Area Photographic System (LAPS)
5. Classified Video Distribution System (CVDS)
6. Safety Cluster – (2 each) Unclassified, 1 Classified
7. SNL/KTF (Staffing continues at OPNAV for potential transition from DoE to Navy as T&E capability)

Proposal, with exception of KTF, identical to POM-10 submittal. POM-12 Shortfall/Delta not reflective of composition recommendations.
Scheduling Considerations

- MDA/Other Major T&E Programs (MM-III, SM-6, HTV, AHW, Trident) - 12-18 months out (primary launch date, max 2 back up dates; never gone to 2nd b/u date)

- Fleet Training – 4-8 months out; upon completion of quarterly C3F scheduling conference units submit requests for the next two quarters

- S&T – as requirements are identified; i.e. radar programs, typically work evenings and weekends since using limited range services and must de-conflict common use of the frequency spectrum

- Annual keep out periods (Fleet Training & Maintenance):
  - COMSUBPAC Prospective Commanding Officer Ops (2 weeks each Feb/Aug)
  - RIMPAC (Jul of even years)
  - Maintenance Stand-down (2 weeks, 1-2 periods per year as requirements dictate)
  - Holiday Stand-down – three weeks Dec/Jan

- Challenges:
  - Prioritization matrix does not align for Fleet vs T&E
  - On range schedule for Fleet training is fairly stable; more common for T&E programs to delay and reschedule on short notice due to technical issues

- Adjudication to COMPACFLT for unresolved conflicts; only one instance (2008, THAAD) requiring direct involvement at Flag level for resolution – the policy works as long as customers understand potential trade space when changing schedule inside 60 days out
Summary

- **PMRF is a national asset that operates as an integrated test and training range**
  - 60 Military, 140 Government Civilians, 800 Contractors
  - 4,300 Acres; 2.1 million square miles of controlled air/sea space
  - Fleet Training
  - R&D / S&T

- **Uniquely capable to support Fleet Training at PMRF & remote locations, MDA missions (AEGIS, THAAD, GMD), as well as other T&E programs (SM-6, ARDEL, Directed Energy, CNO Projects, ONR/NRL programs, etc.)**

- **Aligned with Navy and National priorities**
  - Sustain Combat Readiness
  - Build a Fleet for the Future
  - Develop 21st Century Leaders
  - Regional Engagement (RIMPAC, Foreign Military Sales)
Mahalo & Aloha
Backup Slides
Instrumentation Barking Sands

1. PMRF North Launch Complex
2. Missile Assembly Bldg. 573
3. Missile Assembly Bldg. 590
4. THAAD Launcher
5. THAAD Block House
6. Ordnance, Targets & Underwater Weapons (Red Label Area)
7. THAAD Contractor Logistics Support
8. Control Tower Crash/Fire Bldg. 300
9. Hangar Bldg. 384
10. THAAD Central Support Facility
11. MPS-25 ROSA (Queen 8)
12. MPS-25 ROSA (Queen 1)
13. SPS-67 (Queen 10)
14. Active Runway 16/34
15. Ordnance Magazine
16. Range Operations Area
1. MPS-25 (Queen-1)
2. MPS-25 (Queen-8)
3. DR COSIP (Queen-4)
4. MPS-25 (Queen-2)
5. FPQ -10 (Queen-5)
6. FPQ-10 (Queen-6)
8. DR COSIP (Queen-15)
9. AN/SPS - 67 (Queen-10)
10. (1) COSIP/MATSS (Queen-16) Not shown.
11. APS-140,RC-26
At an elevation above 3,800 feet, Kokee Park extends the line-of-site coverage from Kauai to 90 nautical miles.
Approximately seven nautical miles north of Barking Sands, Makaha Ridge overlooks the BARSTUR and BSURE ranges. Site elevations are between 1500 and 1700 feet, providing line-of-sight coverage to 60 nautical miles.
Ordnance Facilities

Kauai Test Facility

North Launch Complex

Kamokala Ridge

Red Label Area

Missile Assembly Bldg. 590
PMRF / KTF Sensors

**Tracking Radar Systems**
- 4 – AN/MPS-25 ROSA
- 2 – AN/FPQ-10
- 3 – WB COSIP
- 1 – AN/FPS-16

**Surveillance Radar Systems**
- 1 – AN/SPS-67(V)1
- 1 – AN/SPS-48E
- 3 – AN/APS-134(V)
- 2 – AN/APS-140

**Guided Missile Fire Control System**
- 1 – MK74 MOD15

**Telemetry Equipment**
- 1 – GKR-8A antenna
- 3 – KAM TM antennas
- 4 – 150-20 TM antennas
- 1 – 20-ft Autotracking Antenna (KTF)
- 1 – 15-ft Autotracking Antenna (KTF)
- 1 – 15-ft S-band Antenna (KTF)
- 1 – Dual-Helix P-band Array (KTF)
PMRF / KTF Launch Capability

KAUAI TEST FACILITY (KTF)
- Stool Launcher (1)
- 20k Launcher (2)
- 7.5k Launcher (2)

THAAD

Mk-5 Launcher

GQM-163

TTV

KAUAI TEST FACILITY (KTF)

THAAD

MRT

50k Launcher

(3) BQM-34 Rail Launcher

VANDAL BQM-8G

BQM-74 Launch
PMRF / KTF Launch Capabilities

PMRF Multi-Use Launch Pad
A. 50k Launcher (1)
B. Lance (Portable) Launch Sites (2)
Smokey Sams (Portable Launchers)
(Smokey Sams Not Shown)

KTF (Kauai Test Facility)
C. Rail-guided 7.5k Launchers (2)
D. Rail-guided 20k Launchers (2)
E. STARS Launch Pad (1)
M. 7.5k Launcher @ Kokole Point (1)

PMRF North Launch Pad
F. Dual Vandal BQM-8G Launcher (1)
G. BQM-34 (Permanent) Launcher (1)
H. BQM-34 (Portable) Launchers (2)
I. BQM-74C Launchers (4)
J. LOKI Rocket Launchers (2)
K. Super HAD Launcher (1)
L. MK-5 Launcher (1)
APS-134 General Purpose Surface Search Radar, Remotely Operated on Niihau Island

APS-67 Surface Search Radar (Queen-10)

APS-48E Surface & Air Search Tracking Radar (Queen-7)

(2) Contractor operated S61N

APS-140 Airborne Surface Search Radar on C-26
Electronic Warfare

Makaha Ridge, Kauai
4 UPT-2A (fixed)
1 CESSIM
1 ULQ-26
2 FIC

Barking Sands, Kauai
1 JTE (mobile)
1 MRES (mobile)
2 AGTTS
5 UPT-2A (mobile)
1 STE
2 PADS
7 Target Mock-ups
1 FIC
Stinger Rounds
Smokey Sams

Perch Site, Niihau
1 MRES
2 UPT-2A
1 ULQ-26

Mauna Kapu, Oahu
1 ULQ-26
3 UPT-2A (fixed)
1 FIC

Barbers Point, Oahu
3 UPT-2A (mobile)

PTA, Big Island
6 Target Mock-ups
Moch Airfield
Echo Target
AAA/SAM Site
Underwater Range

Total Area = 1100 Square Miles

- Largest Instrumented Range in the World
- Up to 12 Mk-84 Coded Pulse Pingers
- Splash Point Metric Location Capability
- Tracking: 10 feet - Splash Point: 30 feet

**Barking Sands Underwater Range Expansion (BSURE)**

- Depths: 6,000 – 15,000 Feet
- Area: 22.5 x 40 Nautical Miles, 900 Square Miles
- Existing Hydrophones: 18

- BSURE TO BE UPGRADED / REFURBISHED TO 41 HYDROPHONES IN OCT 2010.

**Barking Sands Tactical Underwater Range (BARSTUR)**

- Depths: 1,800 – 6,000 Feet
- Area: 12 x 10 Nautical Miles, 120 Square Miles
- Hydrophones: 42

**Shallow Water Training Range (SWTR)**

- Depths: 129 – 1,800 Feet
- Area: 12x10 Nautical Miles, 80 Square Miles
- Hydrophones: 118

Underwater Ranges uses for training/operations include:

- Sonar
- Torpedo Training (ASW Exercises/ASW Rodeo)
- Tactics (Combat System Ships Qualification Trials)
- Ship Detection
- Submarine Commanders Graduation Course (Hollywood)
PMRF MRTFB Current Assets

1 – COSIP WB Radars (3)
2 – Telemetry Antenna’s (8)
3 – SHOTS (2)
4 – VTM (2)
5 - MK-74
6 - MATSS (HM&E, Comms)
WB DR-COSIP RADAR
- Wide Band Digital Receiver-COherent Signal Processor -

WB COSIP at Makaha Ridge

• Radar Type: Wide Band Digital Receiver COherent Signal Processor (WB DR-COSIP)
• Radar Description: Wideband digital instrumentation and tracking radar
• Radar Location: Makaha Ridge/MATSS
• Frequency Band: C-Band (5.4 – 5.9 GHz)
• Bandwidth: 8,500 MHz
• Parabolic antenna (20 ft diameter)
  • Q-4/15: Antenna located in radome

WB COSIP on MATSS

• Range Tracking Subsystem:
  • Radar Control Computer (RCC)
• Provides on-site real time or playback metric and signature displays
  • Resolution: Wideband 0.5m, Narrowband 37m, Doppler 0.26m/s
PMRF Optics

- 2 Stabilized High-Accuracy Optical Tracking Systems (SHOTS)
- 2 Versatile Tracking Mounts (VTM)
- Launch Area Photographic System (LAPS)
- Photography & Video
Telemetry Sites

MAKAHA RIDGE

KTF

KOKEE PARK

Receiver Subsystem

Antenna Controllers

Recorder Subsystem
Mobile AT Sea Sensor (MATSS)

- Tended by tug at all times
- Berthing for 36 persons, duration of 21+ days
- Fully established operational and safety procedures for crew and riders.

- 8 knots in Sea State -3
- 6 knots in Sea State -5

- DR COSIP Radar
- Ku-band VSAT Radar
- C-band VSAT Radar
- Mobile Range Safety System Telemetry Antennas
- (2) Omni Dir. FTS Antennas
- Flight Termination System (FTS) Antennas
- Deck House w/ Optics Inmarsat, Mini-M & Surface Radar
- SHOTS