414

715.3.9.v.

DEPARTMENT OF THE ARMY
BALLISTIC MISSILE DEFENSE SYSTEMS COMMAND
P. O. BOX 1500
HUNTSVILLE, ALABAMA 35807

Not sure if done this

ANNUAL HISTORICAL REVIEW

KWAJALEIN MISSILE RANGE

1 OCTOBER 1982 THROUGH 30 SEPTEMBER 1983

APPROVED BY:

for W. A. Braswell
WILLIAM A. SPIN
Colonel, GS
Director, Kwajalein Missile
Range Directorate

ANNUAL HISTORICAL REVIEW
KWAJALEIN MISSILE RANGE
OCTOBER 1982 - SEPTEMBER 1983

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES

TABLES

Chapter I

MISSION AND ORGANIZATION

Mission and Organization

The mission of the Ballistic Missile Defense Systems Command (BMDSCOM) Kwajalein Missile Range Directorate (KMRD), located in Huntsville, Alabama, is to plan, manage, direct, control and coordinate the overall activities of the Kwajalein Missile Range (KMR), a Department of Defense (DOD) National Range, in accordance with DOD National Range policies and procedures and under the guidance and direction of the National Range Commander.

The directorate also serves as the principal advisor and staff to the National Range Commander for all matters pertaining to the KMR including those matters pertaining to the Trust Territory of the Pacific Islands (TTPI).

The mission of the Kwajalein Missile Range, located on the Kwajalein Atoll, Marshall Islands, is to direct, maintain and operate a National Range, and provide associated services and materiel to support range users and tenants at the KMR. The KMR is government owned and contractor operated. Logistics support is provided by Global Associates under Contract DASG60-80-C-0001. Technical facilities, with the exception of the Kiernan Reentry Measurements Site (KREMS), are operated by Kentron, International, Inc. under Contract DASG60-76-C-0002. The KREMS is operated by Radio Corporation of America (RCA) and General Telephone Electronics (GTE)/Sylvania under the technical direction of Massachusetts Institute of Technology Lincoln Laboratory. A map of the Range showing equipment location is shown in Figure 1, page 3.

The KMRD organization is shown on Figure 2, page 4. Office symbols for the directorate are listed in Table 1, page 5.

Staffing

Personnel strengths for the KMRD are reflected on Table 2, page 6. Key personnel of the directorate are listed in Table 3, page 7.

Funding

The approved funding program to accomplish the mission for Fiscal Year (FY) 83 totalled $151,706,000. Table 4, page 9, reflects a summary breakout of the FY 83 approved funding program.

In addition to the above funding guidance, the KMR was provided funding by range customers in the amount of $25,165,000 in FY 83. Table 5, page 10, reflects the range users and amount of reimbursement funding provided them.

Range Commanders Council

The Range Commanders Council, founded in August 1951, and discussed at length in the FY 72 Historical Summary, continued to function; and the Commanders convened their semi-annual sessions (Fall and Spring) during FY 82 for technical interchange of matters affecting the National and Service Ranges.

OFFICE SYMBOLS
BALLISTIC MISSILE DEFENSE SYSTEMS COMMAND
P.O. BOX 1500
HUNTSVILLE, ALABAMA 35807

SYMBOL	ORGANIZATIONS
BMDSC-R	Office of the Director, Kwajalein Missile Range Directorate
BMDSC-RA	Administrative Office
BMDSC-RP	Program Management Office
BMDSC-RS	Safety Office
BMDSC-RE	Facilities Engineering and Environmental Office
BMDSC-RO	Range Operations Division
BMDSC-ROO	User Requirements Branch
BMDSC-ROS	Range Support Branch
BMDSC-RD	Range Systems Division
BMDSC-RDM	Reentry Measurements Branch
BMDSC-RDI	Range Instrumentation Branch
BMDSC-RDP	Plans and Analysis Branch
BMDSC-RK	Kwajalein Missile Range
BMDSC-RV	U.S. Army Field Office, Vandenberg Air Force Base (VAFB), CA
BMDSC-RH	BMDSCOM Field Office, Honolulu, Hawaii

Table 1 - Office Symbols

PERSONNEL STRENGTH

	KMRD & FIELD OFFICES		KMR	TOTALS
30 Sep 80	MILITARY	7	20	27
	CIVILIAN	71	32	103
				130
30 Sep 81	MILITARY	7	20	27
	CIVILIAN	71	32	103
				130
30 Sep 82	MILITARY	7	20	27
	CIVILIAN	71	32	103
				130
30 Sep 83	MILITARY	7	25	32
	CIVILIAN	70	37	107
				139

Table 2 - Personnel Strength

KEY PERSONNEL

POSITION		
KWAJALEIN MISSILE RANGE DIRECTORATE OFFICE OF THE DIRECTOR		
DIRECTOR	MR. O.E. OVA COL WILLIAM A. SPIN	Jan 82 - May 82 May 82 -
DEPUTY DIRECTOR	MR. H.R. BRASWELL	Mar 82 -
EXECUTIVE OFFICER	MAJ TOMMY H. MARSHALL	Mar 82 -
CHIEF, U.S. ARMY FIELD OFFICE, VAFB	LTC ROBERT L. WENDT	Jun 82 -
CHIEF, FIELD OFFICE, HONOLULU	LTC WALLACE R. NAPIER	Jul 80 -
CHIEF, PROGRAM MANAGEMENT OFFICE	MR. JOHN H. COTTEN	Feb 80 -
CHIEF, SAFETY OFFICE	DR. C.D. SMITH	Dec 78 -
CHIEF, FACILITIES ENGINEERING AND ENVIRONMENTAL OFFICE	MR. JOHN E. ROGERS	Feb 69 -
RANGE OPERATIONS DIVISION		
CHIEF	MR. REINHART H. LEO	Jul 83 -
CHIEF, USER REQUIREMENTS BRANCH	MR. LEROY KEARBY	Aug 81 -
CHIEF, RANGE SUPPORT BRANCH	MR. JOHN PHILLIPS	Jul 83 -

Table 3 - Key Personnel

RANGE SYSTEMS DIVISION		
CHIEF	MR. HARRISON MAXEY	Jul 76 -
CHIEF, REENTRY MEASUREMENTS BRANCH	MR. WALTER L. HOLMAN, JR.	Jul 81 -
CHIEF, INSTRUMENTATION BRANCH	MR. CHARLES C. VESSELS	Jul 83 -
CHIEF, PLANS AND ANALYSIS BRANCH	MR. BERNARD M. DAVIS	Jul 83 -
KWAJALEIN MISSILE RANGE		
OFFICE OF THE COMMANDER		
COMMANDER	COL JOHN BANKS	Jun 82 -
DEPUTY COMMANDER	LTC JAMES VANVLECK	Jul 82 -
CHIEF, RANGE OPERATIONS OFFICE	LTC JOHN S. MACK	Jun 82 -
CHIEF, RANGE SAFETY OFFICE	LTC ALVA SHRONTZ MR. WAYNE SHIRLEY	Jun 80 - Jul 83 Aug 83 -
CHIEF, LOGISTIC SUPPORT OFFICE	LTC HOWARD REED MAJ HENRY E. BROWN	Jul 81 - Jul 83 Jul 83 -

PROGRAM STATUS

FY 83

($ IN MILLIONS)

PROGRAM MANAGEMENT	6.430
GOVERNMENT SUPPORT SERVICES	21.676
MATERIALS AND SUPPLIES	24.000
MODERNIZATION	10.500
CONTRACT SUPPORT	89.100
TOTAL	151.706

TABLE 4 - PROGRAM STATUS

KMR DIRECT SUPPORT REIMBURSEMENT

FY 83

($ IN MILLIONS)

ARMY	
BMD ADVANCED TECHNOLOGY CENTER	1.845
BMD SYSTEMS TECHNOLOGY PROGRAM	9.615
AIR FORCE	
WESTERN SPACE AND MISSILE CENTER	4.695
EASTERN SPACE AND MISSILE CENTER	.245
BALLISTIC MISSILE OFFICE	7.635
SPACE DIVISION (AF SYSTEMS COMMAND)	1.080
OTHER	
NOAA	.010
USA PERSONNEL CENTER	.040
TOTAL	25.165

TABLE 5 - KMRD CUSTOMER FUNDING

CHAPTER II

RANGE USERS

The KMR, was established as a national range in 1968 and has the mission of providing support facilities and technical services for DOD components responsible for RDTE of weapon systems and materials. KMR also supports other federal agencies having a need for its support, as well as domestic and foreign government agencies under certain conditions. A summary of the range user programs in planning or in progress at KMR in FY 83 is given below:

ARMY PROGRAMS

Ballistic Missile Defense Advanced Technology Center

Several Advanced Technology programs are currently planned for KMR in out years. They include the Airborne Optical Adjunt (AOA), ENDO Atmospheric Defense (ENDO) and High Altitude Defense (HAD).

The Designating Optical Track (DOT) program experiments are designed to determine the ability of missile borne optical sensors to designate and track incoming reentry vehicles. This program continues to impose increasingly precise requirements on the range as the complexity of each mission increases. Planning continues for out year support.

Multistatic Measurements System (MMS), a program jointly funded by BMDATC and BMDSTP, has as its objective the increased accuracy and reliability of metric measurement of RV trajectories. Remotely located radars provide different views of the same target in real time. The system became operational in FY 83.

Ballistic Missile Defense Systems Technology Program

The Systems Technology Test Facility located on Meck Island is operating and exercising against various targets. This facility consists of the systems technology radar subsystem and a data processing subsystem.

The Homing Overlay Experiment (HOE) program is designed to demonstrate the maturity of technologies necessary to provide an effective defense against evolving ballistic missile threats using an exoatmospheric nonnuclear kill mechanism. This program involved launches of the Ballistic Missile Organization (BMO) Minuteman I (MMI's) (Systems Technology Reentry Program (STREP)) from the Western Space and Missile Center (WSMC) at Vandenberg AFB, CA as targets for HOE missions launched from Mech Island. This requires metric, signature, optical and telemetry data. During FY 83, KMR successfully supported missile launches associated with this program.

The Signature Measurements Radar (SMR) program was continued utilizing targets-of-opportunity and dedicated STREP missions to collect data to support the design of a X-band phased-array BMD radar system.

AIR FORCE PROGRAMS

BMO's Advanced Strategic Missile System (ASMS), formerly the Advance Ballistic Reentry System (ABRES), continues use of KMR for reentry vehicle testing. The Large Ballistic Recovery Vehicle (LBRV II), a subprogram of the ASMS, was successfully supported during FY 83. HAVE JEEP, a BMO/ASMS subprogram, is a continuing program for testing payloads utilizing low-cost sounding rockets, launched locally, to simulate intercontinental ballistic missile system (ICBM) reentry. Launches are made from Roi-Namur Island. Planning continues for HAVE JEEP VI flights for testing PEACEKEEPER penetration aids.

The Strategic Air Command (SAC) MM II Special Operational Tests (SOTs) are designed to define the operational capability of the MM II weapon system. Test objectives include miss distance, reentry accuracy, fusing accuracy, chaff geometry, and signature. This requires metric, signature and telemetry data, and impact scoring by KMR.

The SAC MM III Operational Test Program has the same general objectives as discussed for the MM II SOT above and requires the same KMR support. Vehicles targeted for land areas continued in FY 83.

The TITAN Program supports diversified DOD and National Aeronautics and Space Administration (NASA) payloads. Support requirements are identified with the particular payload program. Present planning predicts an average of two launches per year from Patrick AFB. KMR support is required for telemetry and metric data acquisition for orbital missions.

The PEACEKEEPER Flight Test Program, sponsored by the BMO, is designed to gather data for the development of a new ICBM. To meet the requirement for PEACEKEEPER, KMR must utilize metric, signature, optical, and telemetry data gathering sensors and the Caribou Terminal Area Support Aircraft (C-TASA) with telemetry and optics systems and a sonobuoy missile impact location system (SMILS). The first PEACEKEEPER was successfully supported during FY 83.

In the Space Object Identification (SOI) Program, the Kiernan Reentry Measurements Site (KREMS) radars (Target Resolution and Discrimination Experiment (TRADEX), Advanced Research Projects Agency (ARPA) Lincoln C-Band Observable Radar (ALCOR), and ARPA Long Range Tracking and Instrumentation Radar (ALTAIR)), respond to the operational requirements of the U.S. Air Force (USAF) spacetrack system during normal duty hours on a non-interference basis with other range requirements. Approximately 60 identifications per year are made.

The ALTAIR continues to support the Air Force's Space Detection and Tracking System (SPADATS).

Construction began 1 May 83 on the Global Positioning System (GPS) Ground Antenna (GA) and Monitor Station (MS) which were described in FY 82 history. Operational status for the GA will be approximately 1 Apr 84, with the MS to follow approximately Oct 84.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

KMR continues to support the NASA Space Transportation System (STS) Program. This effort is currently increasing as NASA increases their annual missions. During FY 83, KMR supported 4 missions and is planning 8 to 10 missions for FY 84.

MISSIONS

During FY 83, KMR participated in 113 U.S. launched missions including 90 Earth Resources Support System (ERSS) and Defense Meteorological Satellite Program (DMSP) meteorological rockets launched from KMR. A chronology of major missions involving other ranges follows:

08 Oct 82 WSMC Op 5393, a BMO MM I STREP-21 - BMD technology mission.

15 Oct 82 WSMC Op 4038, a SAC MM II SOT, designated GT-143 MS1.

30 Oct 82 ETR 0793, an Air Force TITAN 34D, space probe mission.

11 Nov 82 ETR Op 9104, a NASA Space Transportation System STS-5.

02 Dec 82 WSMC Op 3419, a SAC MM III Operational Test, designated GT-9/GM.

08 Jan 83 WSMC Op 3397, a BMO Large Ballistic Recovery Vehicle II, ASMS research and development mission, designated LBRV II.

07 Feb 83 WSMC Op 5393, BMO MM I, System Technology Reentry Program designated STREP-11, target for HOE.

07 Feb 83 KMR Op 8366, a BMD System Technology HOE vehicle launched from Meck Island, designated HOE 1.

24 Feb 83 WSMC Op 9623, a SAC MM III Operational Test, designated GT-92GB.

11 Mar 83 WSMC Op 1588, a SAC MM III Operational Test, designated GT-93GM.

17 Mar 83 WSMC Op 8140, a SAC MM II, Special Operational Test, designated GT-144MS.

04 Apr 83 ETR Op 9105, a NASA Space Transportation System, STS-6.

05 May 83 WSMC Op 0459, a BMO MM I, System Technology Reentry Program, designated target for the BMD technology mission.

28 May 83 WSMC Op 6029, BMO MM I, System Technology Reentry Program, designated STREP-12, target for HOE.

28 May 83 KMR Op 8404, a BMD System Technology HOE Vehicle launched from Meck Island, designated HOE-2.

18 Jun 83 WSMC Op 6713, a BMO PEACEKEEPER, an ASMS research and development mission, designated FTM-1.

25 Jun 83 WSMC Op 2583 (GT-94) and WSMC Op 5682 (GT-95), two SAC MM III's, designated short time interval launches (STIL's).

30 Aug 83 ETR Op 9107, a NASA Space Transportation System, STS-8.

21 Sep 83 WSMC Op 4161 (GT-96) and WSMC Op 9817 (GT-97), two SAC MM III's, operational tests launched within the same 4 hour window, designated a STIL.

29 Sep 83 WSMC Op 0777, a SAC MM II, Special Operational Test, designated GT-145MS.

CHAPTER III

REENTRY MEASUREMENTS RADARS

KIERNAN REENTRY MEASUREMENTS SITE (KREMS)

KREMS took data on a variety of Army and Air Force missions during FY 83. The Army STREP missions were designed for collection of data from L- through X-band on special reentry vehicles. During these missions, KREMS designated the Signature Measurements Radar, which occupied a site at Roi-Namur for the entire year. On STREP-22, the last of the STREP missions, the Millimeter Wave Radar (MMW) tracked the reentry payloads and extended the Army data base up to 35 GH_Z.

The Army also initiated the Homing Overlay Experiments (HOE) with two missions. On these missions, ALCOR played the part of a Forward Acquisition Sensor and passed smoothered vectors to Meck Island. In addition, the KREMS Data Center smoothed vectors from the FPQ-14 radar at Kaena Point for pre-launch file for Meck.

KREMS radars provided continuing support for the MM II and MM III programs. The first two PEACEKEEPER missions were flown to KMRN and were covered by ALCOR, TRADEX and ALTAIR. The Air Force also launched LBRV-2, a lagoon recovery mission, which included a wake quench experiment on which radar signature measurements were the prime requirement.

The MMW became operational at 35 GH_Z in May for STREP-22 and for the balance of the year took reentry measurements for BMDATC.

The Multistatic Measurement System became operational and began to build a data base.

KREMS RADAR CONTROL CENTER (KRCC)

The High Speed Data Link became operational, and data were routinely transmitted from site to Lexington the day after the mission. Two 6250 BPI tape drives were installed to increase transmission speed and make the data more compact.

KRCC continued to support the SMR by sending directing state vector data to that radar on each mission during reentry. Tank break-up scans were also directed by KRCC.

ARPA Lincoln C-band Observables Radar (ALCOR)

The Rapid Imaging link to the Cheyenne Mountain Complex became operational. With this system, it is possible to extract selected data from a satellite pass and send it over the secure link immediately after the track. Radar images are then made at the Mountain. Plans were made to do the imaging at ALCOR and send the digitized images to the Mountain. The capability will be extended to include MMW.

MILLIMETER WAVE RADAR (MMW)

The radar started the year by taking 35 GH_Z data on a number of missions while receiving designation from ALCOR. In May, the first mission (STREP-22) was taken with the radar tracking the reentry target. MMW was in self track on all subsequent missions.

In September, the radiometer was used on two missions. This device took 97 GH_Z passive data on the targets in 35 GH_Z track. These data were taken for BMDATC.

A major problem for MMW at year's end was a 10 dB sensitivity deficit from the design value. Various solutions were proposed for recovering a sizeable part of that deficit.

Target Resolution and Discrimination Experiment Radar (TRADEX)

An HP-1000 Array Processor was delivered. It will be used to coherently integrate weak target signals at long range.

The Multistatic Measurement System (MMS) became operational in Jan 83 and provided both metric and signature data on a number of missions. Because the range calibration procedure had not fully matured, achievement of the sensor's intrinsic metric accuracy involved use of upgrade data that constrain the cross-range errors in the placement of the trajectory plane. With the inclusion of the uprange peg point, MSS position, vector velocity, and vector acceleration goals have been met.

ARPA Long Range Tracking and Instrumentation Radar (ALTAIR)

As of 1 Oct 82, ALTAIR became fully operational as an Air Force Space Detection and Tracking System (SPADATS) contributing sensor, supporting both near earth as well as deep space activities. During FY 83, ALTAIR successfully supported 2479 of the 2607 North Americal Defense (NORAD) tasked near earth events and 19349 of the 22415 deep space events. SPADATS scheduled hours totaled 6584.5 during this time period.

A new azimuth encoder mount system was installed in Aug to correct for deficiencies of the present system and to improve metric performance.

A Global Positioning System receiver was purchased and delivered to site for the purpose of near real time metric calibration of ALTIAR in its deep space mode of operation. This has been integrated into the ALTAIR system.

Installation of the new UHF TWT transmitter has begun.

A six month study phase for the replacement of the three Honeywell DDP-224 computers was begun in Jul 83.

CHAPTER IV

RANGE TECHNICAL FACILITIES

TPQ-18 Radar

The TPQ-18 is a high-accuracy, long-range, C-band instrumentation radar, built by RCA. The system at KMR is Serial Number One and was acquired from the Space and Missile Test and Evaluation Center's (SAMTEC) Canton Operating Location, in 1975. Disassembly of the radar at Canton Island began 18 October 1975. The radar arrived at KMR 6 Dec 75. Site construction was completed atop Launch Hill on Kwajalein Island and system installation began 26 Apr 75. Installation and checkout phases required two months; initial calibration and operator training took another month; and the radar was declared operational on an engineering test basis 16 Aug 76. The first instrumented RV mission (5688) was supported that date. The radar was declared operational Mar 77.

The contract to develop, design, and manufacture the upgraded equipment was awarded to RCA in Feb 81. The contract is proceeding on schedule and will be completed in Apr 84. A contract was awarded to DBA, Inc., to design and install a Radar Videometric System (RVCMS) for the TPA-18. The installation will be in early 84. It is expected that the system will be operational in the third quarter of FY84.

Range Timing System

A contract was awarded to Data-Chron, Inc., of Costa Mesa, CA, a small business firm, for the Range Countdown and Display (RCDS) portion of the Range Timing System. The RCDS provides control and visual status of the time remaining to the start of a mission and total time elasped since the start of a mission. This information is provided as a time tag for absolute correlation of all instrumentation facilities throughout the KMR and with sensors from other ranges. Both factory and on-site acceptance testing was accomplished with installation to be completed during the early part of FY 84.

A second contract was awarded to Data-Chron for the Greenwich Mean Time (GMT) Display portion of the Range Timing System. These displays supply the GMT or official range time to each instrumentation site. This timeis required to precisely identify the occurrences of various mission events or to denote a precise period between events. Delivery of this portion will occur during the second quarter of FY 84.

This entire timing system is being replaced because of the age of the current system. The manufacturer of the current system is no longer in the timing business; therefore, maintenance support in terms of spares is no longer available. The new system employs current technology and solid state circuitry with spares being available.

Telemetry Systems

A Transportable Telemetry System (TTS) was delivered to the KMR in Jul 83 and installed near building 8132 on Roi-Namur. The TTS consists of an 18 foot diameter S-band autotracking antenna system mounted on a 9 by 28 foot trailer and an air conditioning electronics van mounted on a 9 by 21 foot trailer. The two trailers are towed in tandem with a tractor and are capable of being transported by barge or ship and by a C-141 aircraft. The electronics van houses the antenna controls, telemetry data receivers, data combines, analog data recorders and test/calibration equipment.

Modernization of the Gagan telemetry facility was completed in Sep 83 with the installation of new antenna and receiver control equipment, data receivers and combiners, tape recorders and test/calibration equipment.

Communications

Digital Microwave System (DMS) - During FY 83, the DMS was expanded to provide additional service the islands of Eniwetak and Omelek. With this expansion, the DMS now provides for inter-island communications with all range instrumentation facilities and the Range Operations Control Center for conducting missions and the day-to-day dtechnical operations and administration of the range.

Voice Capability - Additional voice capability was added to the MiT/LL 1.544 MBS High Speed Data Link for use when the circuit is not being used for data transmission. This new capability will increase telephone service from KMR to CONUS with 24 circuits. This capability more than doubles the off-atoll voice capability.

Remote Alarm Reporting System (RARS) - RARS was installed during FY83 to provide detection and reporting of intrusion, fire, air conditioning failure and power failure at 52 sites on nine islands. All alarms detected by remote sensors are transmitted to the Kwajalein Central Police Station where a computerized console provides CRT display and hardcopy printout of all alarms and system status. All system events and operator actions are recorded onm disc storage. The sensors and the central control station are connected suing a voice grade circuit on the DMS between the remote site and Kwajalein. This system has rpovided a comprehensive upgrade of security systems at KMR.

HF Receivers - In FY 83 the obsolete HF receivers at the Ennylabegan Receiver Site were replaced with new modern equipment incorporating state-of-the-art technology frequency scanning and remote control capability. Remote control of the new receivers will be exercised from the TechnicalControl Facility (TCF) located in the KMR Communications Center and the Base Radio Operations on Kwajalein.

Mission Support Communications - In FY 83, the security communications system was upgraded to provide recordings of communications systems, beepers to alert security personnel, radios for patrol boats and a base station at Meck. In addition, a VHF FM system was designed for HOE refueling to allow hands-free operation during refueling operation. A base station with 15 portable units fitted into helmets comprise this system.

Terminal Area Support Aircraft (TASA)

The TASA effort was conceived in Oct 80 as a low cost, high risk approach to provide RV scoring (via SMILS), terminal telemetry (via luneberg lens antenna) and optics data in the Broad Ocean Area (BOA). If successfully developed, TASA could save $54M in 20 years by using existing logistic support aircraft at KMR rather than using the large ARIA and P-3 assets for each PEACEKEEPER (M-X) mission. TASA was successfully developed and on 22 Jun 82 (SAC Glory Trip -88) the entire proof of principle was demonstrated with missile impacts recorded over 18½ nautical miles away with SMILS sonobuoys, TM data was recorded for 5.5 seconds from acquisition of signal through post impact. TASA then provided mandatory coverage for SAC GT-92 at the new PEACEKEEPER impact area at KMRN, 120 nm north of Kwalalein on 2 Dec 82. TASA has since provided superior coverage on all high priority Air Force PEACEKEEPER missions.

KWAJALEIN - Broad Ocean Area Tugboat (K-BOAT)

K-BOAT was a unique technique to survey the Deep Ocean Transponders (DOTs) at the new PEACEKEEPER impact area (Kwajalein Missile Range North (KMRN)). A geodetics reference is necessary in the BOA to obtain an RV score with the Sonobuoy Missile Impact Location System (SMILS) on TASA. Due to the unique geography at Kwajalein, with many small atolls around, a land reference system was used as opposed to satellite reference on all other BOAs. With land geodetics reference, the potential existed to provide a quantum jump in DOT survey in deep water. K-BOAT used a ship leased from DOE (EGABRAG-II), that was ported at Kwajalein. An accurate over the horizon ranging system (HYDROTRAC) was developed along with a ships motion measurement system and acoustic system to communicate with the transponders in 15,000 feet of water. The successful completion of the KMRN survey by K-BOAT in Sep 82 provides the Air Force with the world's most accurate impact area and the ability to score a missile launched 4200nm away (Vandenberg AFB) to 5.4 meters.

Data Handling Systems

The Harris 6024 computer system at the Honolulu Data Reduction Facility was successfully upgraded with a new Harris H-800 computer system. The new computer system provides an increase in data processing capability and reliability. A contract award was made to Harris Corporation for a new

Harris H-800 computer system to be installed at the Ennylabegan TM site. Contract award was made to Perkin-Elmer Corporation for two new Perkin-Elmer 3210 computer systems for the Gagan TM site and the Transportable Telemetry System (TTS).

Range Instrumentation Systems Analysis (RISA)

The Kwajalein Missile Range assures the performance and data accuracy of the range instrumentation sensors through a continuing test and analysis program. This effort is performed by the RISA group under the direction of the Range Systems Division. KMR instrumentation performance and data accuracy were monitored on a continuing basis resulting in consistently high KMR data quality for FY 83. Semiannual reports documenting this data quality were published for trajectory and impact instrumentation. In addition to these reports which are distributed to the KMR range user community, KMR performance and accuracy presentations were made to the Joint Range Instrumentation Accuracy Improvement Group and other interested groups and inputs to Program Support Plans were provided for direct response to users.

The RISA group conducts Performance Evaluation Tests (PETs) to establish baseline instrumentation behavior. This serves as a reference for the performance and accuracy monitoring program. PETs also establish instrumentation certification enabling range users to utilize KMR instrumentation data with confidence. In FY 83, analysis of PET was concluded on the Kwajalein Missile Range North (KMRN) SMILS. Certification efforts were continued with new Super RADOTS. Additional testing was initiated to ensure the accuracy of range timing data.

To assure that high quality instrumentation is developed in the most efficient manner, the RISA group participates in all instrumentation development efforts as appropriate. The most significant effort of this type during FY 83 was support for the TPQ-18 systen upgrade, with the applicaion of phase-derived range techniques to new instrumentation capability. Other developments supported included a planar array TM system for airborne applications and the development of the Multiple Object Tracking Radar (MOTR).

The extraction of performance and accuracy results from the KMR instrumentation requires a continuing effort to develop statistical and analytical methodology. During FY 83, a project was initiated to develop and implement the capability to predict the accuracy of multisensor trajectories under equations of motion constraints. other efforts included upgrades of the software utilized in producing the semi-annual data quality reports, and several algorithms used for analysis of various antennas in use or being considered for use at KMR.

The analysis of raw data continued to be a source of insight into instrumentation characteristics. Raw data from the K-BOAT systems were analyzed to develop a new methods of calibration for the HYDROTRAC. Raw data from SDRs were analyzed to study bias effects.

Analytical studies included investigations of sensor slew rates for local launches, simulations of phase-derived range algorithms and of replacement RDOT surveys.

In response to the increasing complexity of KMR instrumentation systems and in recognition that many performance problems should be attacked in the real-time environment, an on-site analyst is assigned to RISA at Kwajalein. Methodology for quick-look post-mission data analysis has been developed and feedback provided after each of almost twenty missions. On-site performance evaluations were performed using stars, spheres, GEOS and APACHE vehicles. A comprehensive program to improve the real-time range safety data was undertaken, including radar accuracies, KRSS filters, noise models, plume attenuation and phase front disturbances. On-Site instrumentation development efforts included the development of an evaluation plan for the upgraded TPQ-18, evaluations of range trends and noise, investigations of RV and APACHE beacons, study of MOTR applications, and implementation of improved acquisition ramps for local launches.

CHAPTER V

RANGE SAFETY

The Range Safety mission is to insure that all reasonable precautions, consistent with operational requirements, are taken during the preparation and conduct of missile and other hazardous operations to prevent injury or damage. Range Safety for all such operations at the Kwajalein Missile Range (KMR) is the responsibility of the National Range Commander, who discharges this responsibility through the Director, Kwajalein Missile Range Directorate (KMRD). This responsibility is carried out by the KMRD Safety Office located in Huntsville, Alabama, and the KMR Range Safety Office located at Kwajalein, Marshall Islands. The KMRD Safety Office develops all Range Safety policy and criteria that apply to hazardous operations at KMR and is responsible for long-range planning and negotiations with potential Range Users. The KMR Range Safety Office is responsible for insuring that all established criteria are followed and for providing operational Range Safety support during missile operations.

During FY 83, the following events occurred in the Range Safety area:

QUEEN MATCH Safety Support

On 20 January 1983 at Boeing, Seattle the KMRD approach for using a Transportable Safety System in support of QUEEN MATCH campaign missions was discounted in favor of an integrated launch and operations facility to be designed by Boeing. KMRD will provide safety support and, potentially, any ground and flight safety officers required. The Safety Analysis contractor was tasked to analyze the desired trajectories. The completed study indicated significant hazards and acceptable longer-range and alternative trajectories featuring quicker pitch-over were found. Some facilities design review was accomplished but it is expected to be redone when more specific facilities designs are available.

Answers to RMI Questions on Depleted Uranium

During a meeting with Roger Ray, DOE in December 1982, Marshallese representatives asked four questions regarding radioactivity and missile testing. Answers to these questions, indicating no health or safety problem associated with the Marshall Islands environment, were forwarded to President Kabua on 5 February 1983.

Range Safety Group (RSG) of the Range Commanders Council (RCC)

The KMRD Safety Office has supported the RSG and its two Ad Hoc Committees on Flight Termination Systems and Laser Safety (the latter begin temporarily inactive) for the past year. The March 83 RSG meeting was held at Eglin AFB, FL where the emphasis was on hazards caused by ricochet and deflection problems and the computer models for defining "containment ellipses." KMRD hosted the November 1983 RSG meeting, and served as the site for two working group meetings on the RS-10 (Flight Safety Training)

and RS-11 (New Technology Safety Alternatives) tasks. The Flight Termination Systems Ad Hoc Committee met in Ben Salem, PA In July 1983 and in Corpus Christi, TX in November 1983 to work on FTS Receiver and Transponder catalogs, test procedures for non-coherent radar transponders, and the performance evaluation and quality assurance of range safety radar transponders and telemetry systems.

Homing Overlay Experiment (HOE) Mission Support

The Kwajalein Range Safety System (KRSS) was successfully utilized in the support of two HOE missions. The flight safety officer operated the system in the manual mode for command destruct purposes. All other functions including radar select, data smoothing, and display information were processed automatically. The TPQ-18 radar in the beacon track mode provided excellent track data whereas the skin tracking radar (TRADEX and MPS 36A) could not maintain constant track. Also MPS-36B in the beacon track mode experienced phase front distance track problems. Radar data was augmented using KMRD designed sky screens for the early launch phase of the mission. All systems and safety support activities were reported as excellent or nominal except for the radar track problems noted above.

HOE Design/Modifications Safety Review

Three major issues of concern were identified in the near-term proximate to HOE Mission 1 launch activities. All were resolved to KMRD Safety Office satisfaction prior to issuance of safety approvals. These were:

a. Turbomolecular Pump/Air Purge

An air purge and turbo-molecular pump were added to the Homing and Kill Section to meet sensor temperature requirements. This design modification presented potential electrical hazards to ordnance circuits and personnel. The pump was required to operate during final arming operations which presented a possible violation of the Range Safety Manual (RSM). Based on an analysis of the circuit operation, the isolation of the pump power circuit from ordnance lines, the continuous operation of the pump with no switching during no voltage test and electroexplosive device connections, and the successful completion of electromagnetic radiation interference tests on ordnance lines, the Safety Office considered the operation safe to perform and the intent of the RSM met, and advised the HOE Project Office that no exemption to the RSM was required.

b. Premature Stage Separation (PSS) Batteries

Markings indicated that the installed PSS batteries of the Flight Termination System had exceeded the allowable shelf life. Research by the

KMRD Safety Office verified that the expiration term had been categorically, extended six years by the procuring activity (Air Force) and that the unit was suitable for use.

c. End-To-End Destruct Test

Repetition of the end-to-end destruct system test was required by the KMRD Safety Office as a precondition of launch approval.

Kwajalein Range Safety System Configuration Control

Software documentation describing all of the KRSS software was released and placed under tight control procedures during the fiscal year. All software verification testing must however be conducted at KMR due to the lack of adequate computer systems available in CONUS. All changes are approved by the KMRD Safety Office and are certified by the KMR Safety Office.

Flight Safety Mission Support Activities - A new memorandum of agreement with the Air Force Aerospace Defense Command (ADCOM) was published which redefined and clarified reporting of errant missile and missile type classification data from KMR to ADCOM. The KMRD Safety Office is now responsible for obtaining missile type classification from ADCOM and the KMR Range Operations Office is responsible for reporting errant missile data to the launch control unit through realtime communications links. The KMR Safety Office is responsible for providing errant missile information to the KMR Range Control Officer.

Strategic Survivable and Enduring Communications Experiment (STRATSEC)

The STRATSEC experiment sponsored by the Naval Air Development Command, investigated Very Low Frequency communications for use in a post-nuclear burst environment. This experiment used a balloon to loft an 18,000 foot, center-fed, dipole antenna and transmitter to an altitude of 100,000 feet, and was launched from Kwajalein. Both ground and balloon-borne receivers were deployed at Wake Island and Guam to enable evaluation of signal strength and other transmission characteristics. The experiment, conducted during early November 1983, was less than fully successful due to structural problems with the balloons. In support of this program, the Safety Offices (-RS and -RKS) reviewed the Flight Termination System design for adequacy and ensured that procedures for handling ordnance and lithium batteries were proper and safe. Allowable flight corridors were identified for balloon operations.

New Technology, Incorporated (NTI) Activities

NTI's contract for Flight Termination System (FTS) Analysis has been ongoing since September 1981. In FY 83, three major tasks, Study Task Order (STO) 4, 5, and 6, were assigned. STO 4 provided analyses of FTS components, circuitry and procedures for HOE and SENTRY Projects. Technology assessment studies were performed to define the relative merits of FTS components and concepts, with results documented as a handbook intended to apprise experienced engineers of subtleties of FTS concepts. The handbook also contains a bibliography of FTS literature. Additionally, KRSS Configuration Change Requests concerning circuits of the Command and Status Panel were reviewed. Some design practices were found to be questionable and resolution is pending completion of the HOE mission. STO 5 provided for development of a KRSS Reliability Model to perform quantification of present reliability and enable trade studies of future system changes. The model is operational as program KRSSREL on the SETAC System Simulator at BMDSCOM and has been supplied to the Range Safety Office (-RKS) on magnetic tape, with hard copy documentation. STO 6 provided for evaluation of STRATSEC FTS circuit noise immunity and link margins were verified as adequate, and ordnance circuits were reviewed and found acceptable.

SENTRY Safety Activities

There were two SENTRY Program activities which required significant safety support during 1983. They were the SPRINT (warhead and missile) reuse study, and a Command, Control, and Communications (C^3) design concept definition program.

A safety evaluation report on the possible reuse of SPRINT and SPARTAN warhead sections was prepared and provided to a SPRINT/SPARTAN Warhead Project Officers Group. This safety evaluation report was included in a reuse study report which is being staffed to DA/DOD decision-makers. Safety comments and recommendations were also provided to the SENTRY Project Office on inspection and testing of SPRINT motors. These inspections included electrical testing of live motors and disection of propellant for characterization studies.

The Sandia Corporation was tasked by the SENTRY Project Office to assist in determining launch control concepts for SENTRY Interceptors. Sandia support included review of proposed deployment and launch control concepts with an intent of determining whether a coded switch should be used in the system and to determine an appropriate location for such a switch. The Safety Office assisted in meetings with Sandia and provided presentations on nuclear surety requirements and background history. This effort was terminated at the end of the year pending further definition of

BMD program milestones.

Flight Safety Analysis

The RKDOT5 three-degree-of-freedom trajectory model was modified via several additional subprograms to include simulation of local wind effects. (Previously, only Coriolis accelerations were included.) This enables more accurate prediction of impact dispersion, especially for low beta debris. Provisions were made so that either specific wind values (range and crossrange) could be manually inserted, or entire monthly tables of Kwajalein atomospheric data could be input to the program.

Flight Safety Issue Resolution for STREP 22

The STREP 22 mission incorporated deployment of an RV decoy from the aft end of the reentry body of a vehicle launched from WSMC. Beginning 180 seconds after launch of the STREP vehicle from WSMC, the decoy mechanism was errected, aligned, spun-up and launched. The Safety Office had concerns regarding apparent lack of consideration of failure modes in the deployment sequence when selecting KMR lagoon impact for both RV and decoy as an initial test objective, and when calculating the original impact dispersions. As a result of this concern Sandia Labs responded with a more detailed analysis and the target impact was changed to outside of the KMR lagoon. Based on the information from Sandia and change in target location, the flight safety analysis determined that the risks associated with this mission were acceptable.

Explosives Safety Waivers

During FY 83, this office issued one explosive safety waiver (W-1-83) and cancelled two existing waivers (W-1-82 and W-2-82). W-1-83 actually replaced W-2-80 and renewed the waiver of exposure of the KMR golf courses to the explosives storage sites. An exemption request for this exposure was submitted to HQDA in 1979 but no answer has been received. W-1-83 will expire 1 July 1986. W-1-82 allowed explosives loadings of magazines 1730 and 1731 on Kwajalein to reach 10,000 lbs each in spite of the exposure to the airfield. This waiver was required to support demolition activities during FY 83. Those activities have ceased therefore the waiver has been cancelled.

Fire Protection for Remote Based, Mission Critical Instrumentation Facilities, KMR

As a result of the Gagan TM Van fire on 3 November 1981, and IAW MG Tate's desires, a study was conducted by BMDSC-RKS to assess the need and feasibility of providing automatic fire detection and suppression systems to protect all the remote sensors, processors, and other unique, high

dollar-value, mission essential equipment at KMR. This office reviewed the study closely and concured in the findings. Corrective action was well defined and considered essential. It was our conclusion that the Kwajalein Missile Range operates under a significant risk to its mission performance capability due to the fire damage exposures identified in the study. These exposures have resulted in over a million dollar loss in the past three years. KMR identified a very practical, comprehensive, time-phased solution to this situation. As a result, KMRD management gave approval to task the logistics support contractor to subcontract professional protection engineering to produce final designs and specifications (pre-engineered, modular systems), and to procure and install the systems. The project involves seventeen facilities on eight islands and has an ROM cost of $315,000. Target date for project completion is 1 October 1984.

EMR Protection Program

During this year, the KMR Electromagnetic Radiation (EMR) Protection Program enjoyed substantial attention, due partly to the FY 82 evaluation of its poor condition, and significant progress has been made, especially in the area of program documentation. Individual files have been established for the primary emitters, and hazard analyses have been prepared. Reports of surveys have also been collected. The medical surveillance program for exposed employees is now active, and a completely updated, definitive KMR regulation (KMRR 385-3, dated 27 July 1983) has been published. Overall, the program is considered back on-track and KMR is nearing readiness to host the US Army Environmental Agency survey mandated by HQDA (AR 40-583). The survey is scheduled for January 1984.

Safety Review of Facility Construction, KMR

Major facility construction plans are routinely reviewed by the safety office to ensure incorporation of mandated safety features. During FY 83, design drawings for the Multipurpose Recreation Facility, the Global Positioning Satellite (GPS) station, both on Kwajalein, and two structures on Omelek, the Explosives Storage Building and the Small Rockets Assembly Building, were reviewed. Safety features were recommended and incorporated. Of particular note was the installation of a HALON fire suppression system in the GPS structure to protect the high value instrumentation.

Hypergolic Fuel Spills

During a transfer loading operation which involved pumping monomethyl hydrazine (MMH, the fuel component of the hypergolic propellants used in the HOE program) from the storage tank at Roi Namur into the transfer cart for shipment to Meck, a teflon o-ring seal failed allowing MMH to exit the pumping system. Reason for the failure is unknown and under investigation.

Approximately two quarts of MMH sprayed out onto the two fuel handlers and the ground. The fuel handlers immediately reacted as trained and employed emergency backout procedures, thus limiting the size of the spill. The Liquid Propellant Accident Response team (LPART) was on standby and immediately reacted to deluge (@ 800 gallons water) the spill site, and rinse off the fuel handlers. The entire solution was collected and ocean dumped. The storage site was neutralized chemically and is ready for future operations as required. The two fuel handlers were wearing Class A Suits (self-contained breathing apparatus and full-body impermeable outergarmet) and were therefore not exposed directly to the MMH. No injuries or damage were sustained. The suits were neutralized and cleaned, and made ready for reuse. This was the second spill incident while transferring the MMH fuel at KMR (the first involved a minor fire, no damage, no injuries). In both cases, all personnel involved reacted in a calm, professional manner. Employment of the Class A Suits at KMR has proved to be a very fortunate decision.

BMDSCOM Building Structural Integrity

The Safety Office completed a risk assessment study regarding the use of armored document containers (Mosler-type) on the second floor of the BMDSCOM building (106 Wynn Dr.). The study included a structural analysis conducted by the Huntsville Division, Corps of Engineers, and concluded that there is some serious risk associated with use of the armored containers unless limited to specific locations and orientations. The study revealed 18 locations where the containers posed an excessive load situation, and those containers were re-positioned. A control process was instituted to ensure that future container placement is safe, and BMDSCOM supervisors were encouraged to discard armored containers for the lighter-weight key-lock type where document classification would so allow.

Aircraft Crash Rescue Study

As a result of correlary actions (Aug-Dec 82) regarding aircraft firefighting readiness at KMR, the KMR Range Safety Office (BMDSC-RKS) became aware of the limited preparedness at KMR to efficiently and effectively conduct aircraft crash rescue activities in support of large aircraft operations (C-141, C-5A, 727, etc.), especially if such an event occurs offshore. KMR does not have the kind of detailed rescue plans, the equipment, or the trained personnel required to rapidly handle this type event. Discussions on this subject in November 1982 between KMRD Safety, KMR Safety, KMRD Range Support Office (BMDSC-ROS), and the KMR logistics support contractor (Global Associates) resulted in agreement that the problem deserves immediate attention and that the most reasonable avenue of approach is for KMR to evaluate the problem and develop recommendations for corrective action. That agreement resulted in a briefing to the CO, KMR who established an ad hoc study group. Crash rescue preparedness is not a

new requirement (AR 95-26, 1 Nov 78, subject: Aircraft Firefighting and Rescue), however, our current planning has only focused upon airfield crashes and provides absolute minimum information regarding resources, command and control, and training. We currently have no procedures by which to attempt in-water crash rescue. Effort has begun to correct this deficiency. An administrative level procedure has been drafted and implementation is imminent. Assistance was obtained from the USAF Aerospace Resuce and Recovery Service, Scott AFB, IL, to evaluate our equipment and rescue personnel capabilities. Definitive recommendations were obtained and a detailed rescue procedure is under development. Personnel training and some equipment procurement must be accomplished before our crash resuce posture can be classified operational.

Obstructions to Air Navigation, KMR

In conjunction with construction review activities, this office became aware of numerous obstructions to air navigation on the three primary airfields at KMR. These obstructions are facilities, antennae, light poles, trees, etc., which violate the required clear zone defined in TM 5-803-4, Planning of Army Aviation Facilities. There are approximately 245 obstructions but the vast majority are considered "technical" violations vice safety hazards. A number of options have been considered as to how to correct the situation. These include re-designing some obstructions to make them frangible, removing others, and obtaining HQDA waiver for those of a mission essential nature which are not practically removable or re-designable. The US Army Safety Center has been requested to evaluate our situation and to recommend a course of action. Their report is due in December 1983.

Public Safety on Outer Islands, KMR

Prior to the first 1983 KMR downtime, this office requested a survey be conducted of the US utilized mid-atoll islands (particularly Omelek, Gellinam, and Eniwetak), subject to habitation by indigenous personnel during KMR downtimes, to identify any significant public safety hazards that may exist. Of particular concern were any potential health hazards (chemical storage, etc.) or potential injury situations which may attract children or unsuspecting adults. Specific recommendations (removal, fencing, lockout devices on towers, etc.) for correction were solicited. KMR Safety (BMDSC-RKS) responded and provided a set of specific recommendations directed at elimination of hazards to children of unsuspecting adults. No attempt was made to protect against hazards caused by intentional circumvention of protective devices or malicious mischief. The recommended corrective actions were reviewed by this office and approved by this Directorate. Action was taken to ensure completion of the projects by the next downtime when indigenous habitation was anticipated (Mar 83).

SETAC Systems Simulator (SSS) Fire Protection

Resulting from requirements imposed by this office, the SSS facility, located in the BMDSCOM building, was retrofitted with a total flooding HALON 1301 fire protection system, and the existing sprinkler system was made operational. Other fire protection enhancement features included installation of fire walls, portable extinguishers, floor tile lifting tools, and segregated ventilation system. The facility now fully complies with HQDA fire protection standards and affords a high degree of safety to the other BMDSCOM building occupants.

MET Rocket Launches From Omelek

Several requests for MET Rocket launches from Omelek Island that were outside normal safety constraints were evaluated. The deviation requests were for launches with azimuths and elevations that were not within approved limits. The requests were analyzed and launch approvals were given where adequate safety could be assumed.

CHAPTER VI

MAJOR CONSTRUCTION ACTIVITIES

This chapter discusses the major construction activities for FY 83. This includes construction under MCA and RDT&E Appropriations, Plans, and Programs.

Marine Shop - FY 82 MCA

This project included the complete removal and replacement of this shop area and was completed during FY 84. The total cost of this project was $1,508,000. This project is located on Kwajalein Island.

Sewage Treatment Plant Revetment - FY 79 MCA

Placement of 500 to 2,000 pounds of stone rip rap for a total of 550 linear feet on the lagoon side of the Sewage Treatment Plant on Kwajalein Island was accomplished for the protection of this facility from tropical storms. The project included the quarrying of underlayer and armor stone at the northeast corner of Kwajalein Island and transporting it to the site area and placed. The project cost was $282,343.

Global Positioning System

This Air Force funded project, for equipment installation, on Kwajalein Island consists of the installation of a RADOME and related support building, a black vault building, transformer building, and a red room located in building #1008. The project cost was $783,643.

Live Explosives Storage Facility - FY 82 MCA

This facility was constructed to replace existing deteriorated structure building #8001 located on Roi-Namur Island. The structure is made of precast concrete walls installed on a concrete slab with berm area around three sides. Concrete was poured in place for the retaining walls, footing, roof slab, and beams. The total value of this contract was $518,739.

Small Rocket Missile Assembly Building - FY 82 MCA

This facility was constructed to replace badly deteriorated building #8003 located on Roi-Namur Island. The structure was constructed of precast panel walls with poured in place concrete beams, floor, and roof area. Berm area was placed on three sides of structure. The total value of this project is $932,245.

Terminal Area Support Aircraft (TASA) Expansion

This project used RDT&E funds and is the addition of approximately 500 square feet to the existing building #1310 located on Kwajalein Island.

This addition consisted of concrete poured floor steel structural support beams and a combination of precast tilt-up walls and corrugated steel walls. Concrete block wall between new and old structure was removed opening area to accommodate new TASA requuirements. The negotiated price was $86,000.

Chapter VII

BASE SUPPORT ACTIVITIES

General

The Kwajalein Missile Range (KMR) nonindigenous population was 2,777 at the end of FY 83 and is tabulated in Table 6, this chapter. This is 210 less than the population at the end of FY 82.

Base Support

Scope of Work, SW-K-1-83, which delineates the effort to be performed by the logistic support contractor (LSC), Global Associates, under Contract DASG-60-82-C-0063, became effective on 1 October 1982. This contract, awarded following formal competition, is for a three-year period with a government option for an additional two years.

The basic security and law enforcement service contract with Washington Patrol Service, Inc. (WPS), expired on 30 September 1982. This contract contained provisions for a two-year extension option period (1 October 1982 through 30 September 1984) and this option was exercised by BMDSCOM. As this option will expire on 30 September 1984 and the lead time required to execute a new contract is in excess of a year, actions were initiated during FY 83 to prepare a competitive procurement package for these services. This package will address the long-term plan for improving KMR security capabilities and includes the substantial increase in the number and quality of the security and law enforcement personnel assigned to KMR along with other needed improvements. In addition, the KMR Provost Marshal Office has now been augmented by the addition of a Deputy Provost Marshal (Captain), three Physical Security Specialists (Grade E-7) and two Military Police Investigators (Grade E-7). These additional six military personnel will be used to implement a more stringent security program at KMR.

The KMR Backlog of Maintenance and Repair (BMAR) program continued through FY 83. The Pacific Ocean Division (POD), Corps of Engineers, was provided an additional $3,300,000 to accomplish repairs to the primary electrical distribution system on Roi-Namur, repair of the marine dry dock ramp on Kwajalein, and other projects. During FY 83, BMAR projects for salt water piping system repair, Phase II of the family housing plumbing repair, and Phase I of the electrical feeder rehabilitation were completed.

In addition to BMAR projects, POD also completed construction of the marine office and shop facility at the site of the old facility adjacent to Echo Pier.

The LSC completed facilities engineering projects during FY 83 totaling $749,000 for construction; $2,137,000 for repair; $168,000 for equipment-in-place; $17,000 for fabrication; $84,000 for maintenance. Facilities engineering projects approved during FY 83 included construction

of a balloon shelter, rehabilitation of the indigenous barracks at Roi-Namur, construction of a PCB storage area; and replacement of frequency and time error controls in the Roi-Namur power plant. The LSC operated and maintained portable generators in support of the electrical feeder replacement project and provided support to other projects accomplished by the Corps of Engineers contractor.

The energy conservation program which began in FY 74 was very successful in FY 83. In terms of BTU's of energy, overall consumption was 2.2% under the DA assigned goal of 1.49 trillion BTU's. In terms of diesel fuel, the reduction equates to 245,574 gallons.

KMR participated in the second annual ARMY ENERGY AWARENESS WEEK. Activities included posters, radio, television and newspaper publicity, decalcomanias and organized school activities focusing on conservation and efficient use of energy.

Two projects were approved by HQDA in FY 83 under the Productivity Enhancement Capital Improvement Program (PECIP). One of the projects (FY 83 funding) will provide energy savings by double glazing family housing quarters windows to minimize air conditioning losses. The other (potential FY 84 funding) project will reclaim waste heat from air conditioners by installing hot water generators which provide heat for domestic water heating. Both projects will be self amortizing in approximately two years. Approval is pending on a third project (potential FY 85 funding) which would save energy by correcting the power factor on large electric motors.

Two tugs YTM 149 and YTM 180 were selected from the Navy inactive Ship Facilities, Bremerton, Washington, as replacement tugs for KMR's tugs LT 2086 and LT 2087. After transfer from Chief, Naval Operation to the Department of Army, both YTMs underwent extensive overhaul at Marco Drydock and Ship Building Facility in Seattle, Washington. Tugs departed Marco Seattle for KMR in mid-September 1983.

The Product Improvement Program (PIP) for installation of oil water separation, waste water separation, and machinery update was completed on the KMR's liquid/cargo barges, LCUs and LCM-8s during this reporting period.

Two boats for security patrol at KMR were obtained from Aberdeen Proving Ground. The boats J3831 (41-foot) and J3832 (34-foot) were obtained from the Aberdeen Proving Ground for immediate use upon recepit at KMR. The boats arrived KMR December 1982.

An in-depth evaluation of Global Associates managed Marine operation at KMR was conducted 30 Oct - 11 Nov 82. The DA evaluation team was headed

by Dr. Julius Hein, Chief Engineer for TSARCOM. Recommendations by the evaluation team were reviewed and appropriate actions were taken.

The Project Office for Watercraft and Amphibians was formally requested to conduct a feasibility study on the use of air-cushioned vehicles (ACV) at KMR. The use of ACVs at KMR is still under consideration.

The Logistic Support Contractor was requested to perform an in-depth study to identify all equipment, special tooling, support facilities, personnel, etc., that are required to accomplish IRAN of C-7A aircraft at KMR. Study did not indicate any significant cost savings in performing IRAN's at KMR.

A waiver of military customs inspection at KMR applicable to predeparture inspections of DOD aircraft, DOD sponsored cargo, passengers, crew members and accompanied baggage was approved and is effective until further notice or situation at KMR changes to warrant the implementation of military customs program.

Hayes International Corporation of Dothan, Alabama, was awarded a competitive contract for IRAN of seventeen (17) C-7A aircraft (nine aircraft in Phase I; eight aircraft in Phase II under the two-year option provision of the contract). The first aircraft under this competitive contract arrived at Hayes International on 16 May 1983.

The Department of the Army was requested to initiate action to replace/upgrade current aviation assets at KMR. Specifically, dual engine helicopters were requested to replace the currently assigned UH-1H helicopters and fixed wing aircrafts with passenger seating capacity of 90 each were requested for replacement of the C-7A Aircraft.

A subcontract for the overhaul of marine diesel engines was awarded to Shore Line Diesel Maintenance, Inc. of San Francisco, CA, by the LSC. The subcontract is based on overhaul of 26 engines in the basic subcontract and 20 engines in the option period of the LSC contract.

A subcontract for the R-2000 Aircraft Engine and QEC overhaul was awarded to California Engine Service, Inc., of Livermore, CA, by the LSC. This subcontract is based on overhaul of 16 engines in the basic contract and 14 engines in the option period of the LSC contract.

A supply management review was conducted of the supply activities of five range contractors by a team of supply experts from DARCOM. This team provided valuable recommendations for improvement of the various contractors' supply functions.

A comprehensive medical and dental survey was conducted of KMR's medical and dental facilities by a team of medical experts from TAMC in early September 1983. Results of this survey is pending.

The Memorandum of Understanding (MOU) between BMDSCOM and Continental Airlines, Inc., was extended for a five-year period. This MOU provides for support services to be furnished Continental's aircraft landing at KMR.

Actions were initiated and approval was granted to establish a military post office (MPO) at KMR with an effective opening date of 1 July 1984. This action was required because the current United States Postal Office operated under contract with the LSC would no longer be able to operate once the Compact of Free Association between the United States and The Republic of the Marshall Islands (RMI) enters into force.

Due to the declining student population at KMR, a detailed review was conducted relative to the FY 83-84 KMR school budget. This review resulted in elimination of approximately $200,000 from the school budget.

Administrative Use Vehicles (AUV) allocated from FY 81 and 82 procurement actions were delivered to KMR during this period. FY 84 requirements were submitted to the TARCOM and initial indications (based on DA severe budget constraints) were that allocations for FY 83 would be only 25% of requirements. Intensive management actions by both TARCOM and BMDSCOM resulted in significant improvements in these projections. Allocations for FY 83 were increased from 25 percent to 100 percent and FY 84 allocations were increased from 46 percent to 80 percent.

A study was conducted to determine the potential benefits of establishing Army Air Force Exchange Services (AAFES) at KMR. Results of this study revealed a significant change in HQDA policy was implemented in 1982 that would eliminate the distribution of the Army's share of AAFES profits for operation of recreation services effective 1 October 1983 and instead would reserve these funds for construction of new or replacement facilities. Based on this policy change, it was decided that no further consideration would be given to establishment of AAFES support service at KMR.

Severe weather changes, which began in late 1982, created a severe drought at KMR. Less than seven inches of rainfall had occurred between November 1982 and April 1983 which caused concern as to the capability of the lens wells to sustain operation until weather patterns changed. A contingency plan was established to provide two reverse osmosis water purification units (ROWPU) on loan if the drought continued. These units were eventually required and were airlifted to KMR on 3 June 1983. All

lens wells were shut down and the Reverse Osmosis Water Purification Units (ROWPUs) produced approximately nine million gallons of potable water from seawater. Rainfall beginning in late July 1983 began filling the lens wells and added to the stored reserves.

A command TDA survey was conducted in July 1983 by a survey team provided by DARCOM. Two command representatives and a seven-member DARCOM team surveyed equipment utilized by the LSC, the technical support contractor, and the security contractor. Results of this survey will be included in the preparation of MTDA input to HQDA. A significant number of items were found which could be added to the TDA thereby saving RDT&E money when these items require replacement as PEMA dollars are utilized for TDA equipment procurements.

Pursuant to Article XVI B of the KMR Interim Use Agreement 1982-85, the last freeze and chill foodstuffs for Ebeye merchants were received at KMR in June 1983. The established cut-off for sales of these items to Ebeye merchants was 20 September 1983.

KWAJALEIN MISSILE RANGE NON-INDIGEOUS POPULATION - 30 SEP 83

Kwajalein Island		
Commanding Officer, Kwajalein Missile Range and Staff		165
Ballistic Missile Defense Operations		9
Republic of Marshall Islands		5
Corps of Engineers, Pacific Ocean Division		22
Intelligence and Security Command		5
Defense Mapping Agency Topography Center		5
Federal Aviation Administration		21
Kiernan Reentry Measurements Site (MIT/LL, RCA, Sylvania)		492
Global Associates		1020
Kentron International		456
Control Data Corporation		45
Martin Zachary Corporation & SUBS		52
Systems Technology Program Contractors		127
Department of Energy (Brookhaven National Laboratory and U.S. Oceanography)		4
Washington Patrol Services		67
	SUBTOTAL	2495
Roi-Namur Island		
Kiernan Reentry Measurements Site		98
Global Associates		122
Kentron International		16
Washington Patrol Services		17
	SUBTOTAL	253
Meck Island		
Global Associates		10
	SUBTOTAL	10
Ebeye		
Global Associates		19
	SUBTOTAL	19
	TOTAL	2777

Table 6 - KMR Non-Indigenous Population

CHAPTER VIII

KMR RELATIONSHIP WITH TRUST TERRITORY AND THE MARSHALLESE

Negotiations between the Republic of the Marshall Islands (RMI), DOD, and DOI resulted in the signing of a three-year KMR Interim Use Agreement (IUA) 20 October 1982. This IUA provided RMI assurance of noninterference with KMR operations during the term (1 October 1982 to 30 September 1985) of the IUA. In return, DOD and DOI agreed to provide funding to the RMI totaling $9.06M FY 83, $11.06M FY 84, and $11.06M FY 85. The IUA contained provisions for continuous economic development in the RMI and exclusive use of certain land area by the United States. Also, it provided for the establishment of a Community Relations Council consisting of representatives from both KMR and the RMI. The purpose of this council is to identify and consider all matters affecting relations between the KMR and local Marshallese communities and to recommend actions as appropriate.

The Marshall Island Legislature, on 20 September 1983, approved the Compact of Free Association. Approval by both Houses of the US Congress is pending.

The US Army License and Support Agreement between the RMI and BMDSCOM, which provides for landing rights at Kwajalein Island for RMI aircraft, was extended through 30 September 1983.

CHRONOLOGY

Oct 82	IUA established Community Relations Council consisting of representatives from RMI and KMR.
Jan 83	Multistatic Measurement System became operational.
Feb 83	Supported first HOE mission.
May 83	Construction began on GPS Ground Antenna and Monitor Station.
Jun 83	Drought experienced from Nov 82 to April 83 necessitated airlift of ROWPUs to provide water.
Sep 83	RMI approved Compact of Free Association.

GLOSSARY OF ABBREVIATIONS (ACRONYMS)

ABRES	Advance Ballistic Reentry System
AFB	Air Force Base
ALCOR	ARPA Lincoln C-Band Observable Radar
ALPS	Air Launched Probe System
ALTAIR	ARPA Long Range Tracking and Instrumentation Radar
AMARV	Advanced Maneuvering Reentry Vehicle
AOA	Airborne Optical Adjunct
APATS	ARIA Phased Array Telemetry System
AR	Army Regulation
ARIA	Advanced Range Instrumentation Aircraft
ARPA	Advanced Research Projects Agency
ASMS	Advanced Strategic Missile System
ATC	Advanced Technology Center
AUV	Administrative Use Vehicles
BMAR	Backlog of Maintenance and Repair
BMD	Ballistic Missile Defense
BMDATC	Ballistic Missile Defense Advanced Technology Center
BMDSCOM	Ballistic Missile Defense Systems Command
BMDSTP	Ballistic Missile Defense Systems Technology Program
BMO	Ballistic Missile Organization
BOA	Broad Ocean Areas
BTU	British Thermal Unit
CRT	Cathode Ray Tube
C-TASA	Caribou Terminal Area Support Aircraft

DA	Department of the Army
DDTE	DOD Test and Evaluation
DMS	Digital Microwave System
DMSP	Defense Meteorological Satellite Program
DOD	Department of Defense
DOD(ISA)	Department of Defense (International Security Affairs)
DOE	Department of Energy
DOI	Department of Interior
DOT	Designating Optical Tracker
EATS	Extended Area Test System
EEC	Enterprise Electronics Corporation
ENDO	ENDO Atmospheric Defense
ERSS	Earth Resources Support System
FY	Fiscal Year
GA	Ground Antenna
GMD	Ground Meteorological Device
GMT	Greenwich Mean Time
GOMI	Government of the Marshall Islands
GPS	Global Positioning System
GTE	General Telephone Electronics
HAD	High Altitude Defense
HOE	Homing Overlay Experiment
HQDA	Headquarters Department of the Army
HQPACAF	Headquarters Pacific Air Force
ICBM	Intercontinental Ballistic Missile
ICC	Instrumentation Control Center

IIP	Instantaneous Impact Prediction
IPTV	Initial Propulsion Test Vehicle
IRAN	Inspect Repair As Necessary
IRBM	Intermediate Range Ballistic Missile
IUA	Interim Use Agreement
K-BOAT	Kwajalein Broad Ocean Area Tugboat
KMR	Kwajalein Missile Range
KMRD	Kwajalein Missile Range Directorate
KMRN	Kwajalein Missile Range North
KRCC	KREMS Radar Control Center
KREMS	Kiernan Reentry Measurements Site
KRSS	Kwajalein Range Safety System
KW	Kilowatt
LBRV	Large Ballistic Recovery Vehicle
LCM	Landing Craft, Mechanized
LCU	Landing Craft, Utility
LoADS	Low Altitude Defense System
LSC	Logistics Support Contractor
MAC	Military Airlift Command
MCA	Major Construction Activity
MM	Minuteman
MMS	Multistatic Measurements System
MMW	Millimeter Wave
MOTR	Multiple Object Tracking Radar
MRTFC	Major Range and Test Facility Council
MS	Monitor Station

MSS	Meteorological Sounding System
NASA	National Aeronautics and Space Administration
NORAD	North American Defense
PECIP	Productivity Enhancement Capital Improvement Program
PET	Performance Evaluation Test
POD	Pacific Ocean Division
RADOT	Recording Automatic Digital Optical Tracker
RARS	Remote Alarm Reporting System
RCA	Radio Corporation of America
RCC	Range Commander's Conference
RCDS	Range Countdown and Display
RDTE	Research, Development, Test, and Evaluation
REDS	Radar Error Detection System
REMP	Reentry Environment Measurements Program
RF	Radio Frequency
RISA	Range Instrumentation and Systems Analysis
RMI	Republic of the Marshall Islands
ROWPUs	Reverse Osmosis Water Purification Units
RV	Reentry Vehicle
RVMS	Radar Videometric System
SAC	Strategic Air Command
SAMTEC	Space and Missile Test and Evaluation Center
SMILS	Sonobuoy Missile Impact Location System
SMR	Signature Measurements Radar
SOI	Space Object Identification
SOT	Special Operational Test

SOW	Scope of Work
SPADATS	Space Detection and Tracking System
SSTSS	Strategic Systems Test Support Study
STREP	Systems Technology Reentry Program
STS	Space Transportation System
SVT	System Verification Test
TARCOM	Tank-Automotive Materiel Readiness Command
TASA	Terminal Area Support Aircraft
TCF	Technical Control Facility
TDY	Temporary Duty
TRADEX	Target Resolution and Discrimination Experiment
TSARCOM	Troop Support and Aviation Materiel Readiness Command
TTPI	Trust Territory of the Pacific Islands
TTS	Transportable Telemetry System
TWT	Traveling Wave Tube
UHF	Ultrahigh Frequency
USAF	US Air Force
VAFB	Vandenberg Air Force Base
WFR	Wind Finding Radar
WPS	Washington Patrol Service
WSMC	Western Space and Missile Center