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

ANNUAL HISTORICAL REVIEW

KWAJALEIN MISSILE RANGE

1 OCTOBER 1979 THROUGH 30 SEPTEMBER 1980

APPROVED BY:

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ANNUAL HISTORICAL REVIEW
KWAJALEIN MISSILE RANGE
OCTOBER 1979 - SEPTEMBER 1980

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MISSION AND ORGANIZATION

Mission and Organization

The mission of the 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, 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 to include matters pertaining to the Trust Territory of the Pacific Islands (TTPI).

The mission of the Kwajalein Missile Range (KMR), 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 RCA and 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 Kwajalein Missile Range Directorate 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.

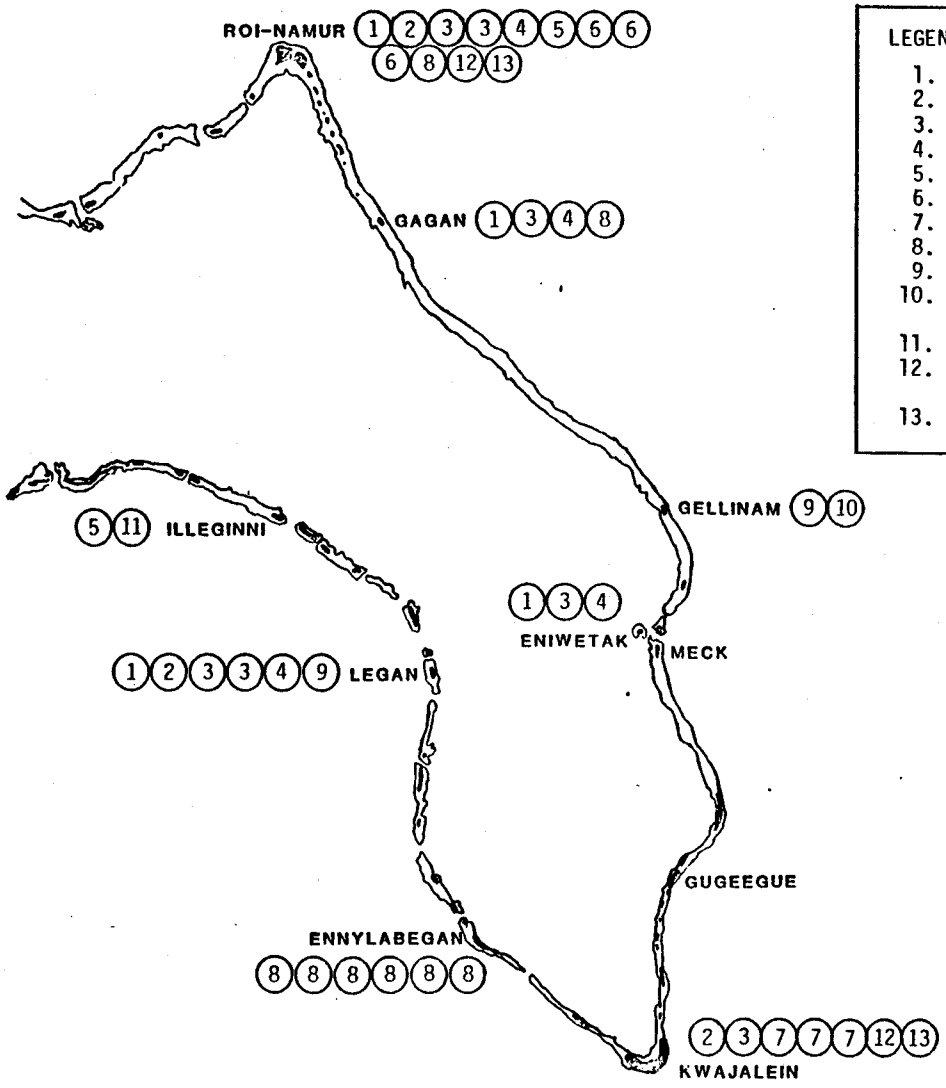
Funding

The approved funding program to accomplish the mission for FY 80 was $98,841,000. Table 4, page 9, reflects a summary breakout of the FY 80 approved funding program.

In addition to the above funding guidance, the KMR was provided funding by range customers in the amount of $17,504,000 in FY 80. Table 5, page 10, reflects the range users and amount of reimbursement funding provided them.

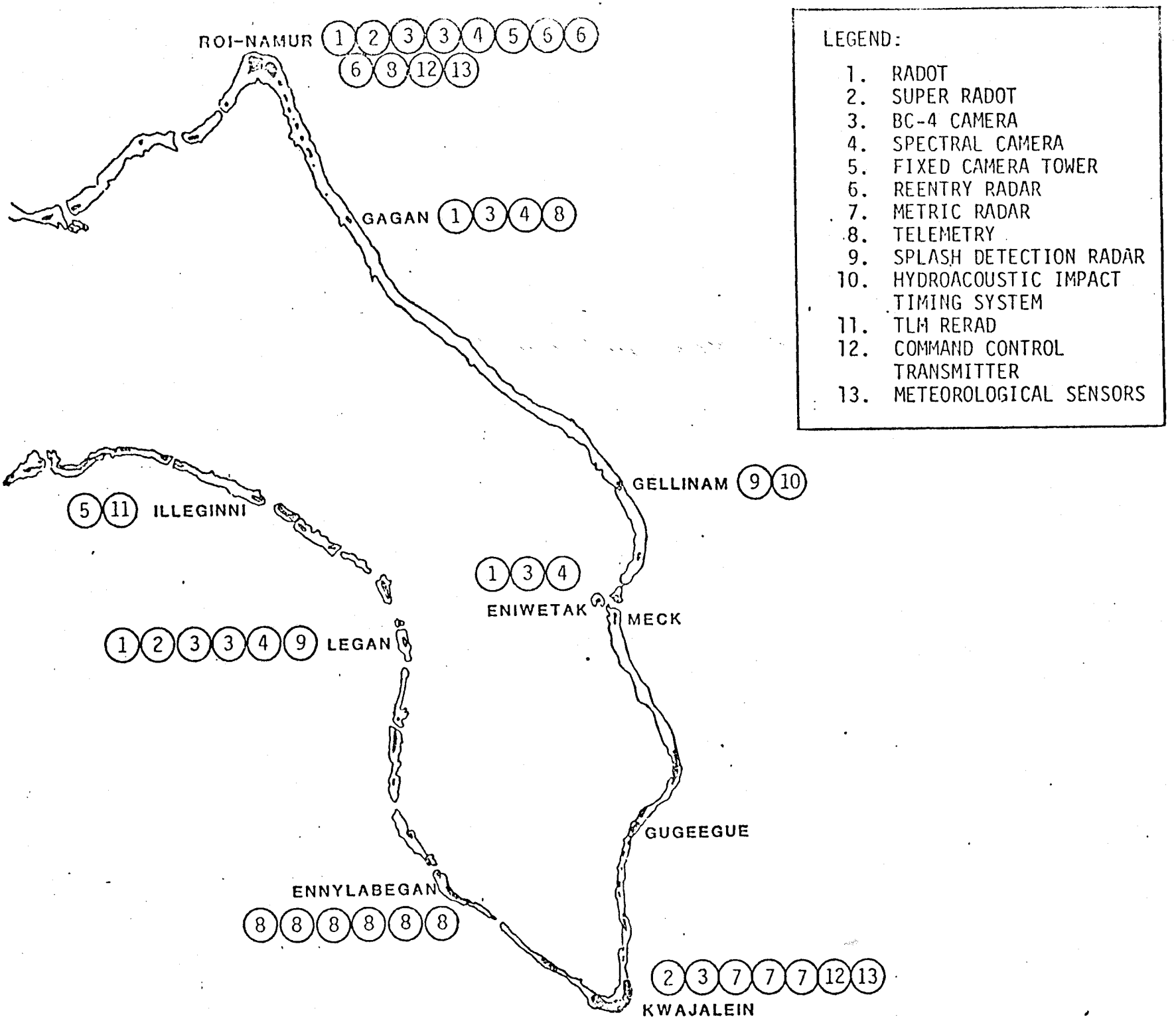
Range Commanders Council

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 80 for technical interchange of matters affecting the National and Service Ranges.



LEGEND:

1. RADOT
2. SUPER RADOT
3. BC-4 CAMERA
4. SPECTRAL CAMERA
5. FIXED CAMERA TOWER
6. REENTRY RADAR
7. METRIC RADAR
8. TELEMETRY
9. SPLASH DETECTION RADAR
10. HYDROACOUSTIC IMPACT TIMING SYSTEM
11. TLM RERAD
12. COMMAND CONTROL TRANSMITTER
13. METEOROLOGICAL SENSORS



KWAJALEIN MISSILE RANGE

Figure 1 - Kwajalein Missile Range

KWAJALEIN MISSILE RANGE DIRECTORATE

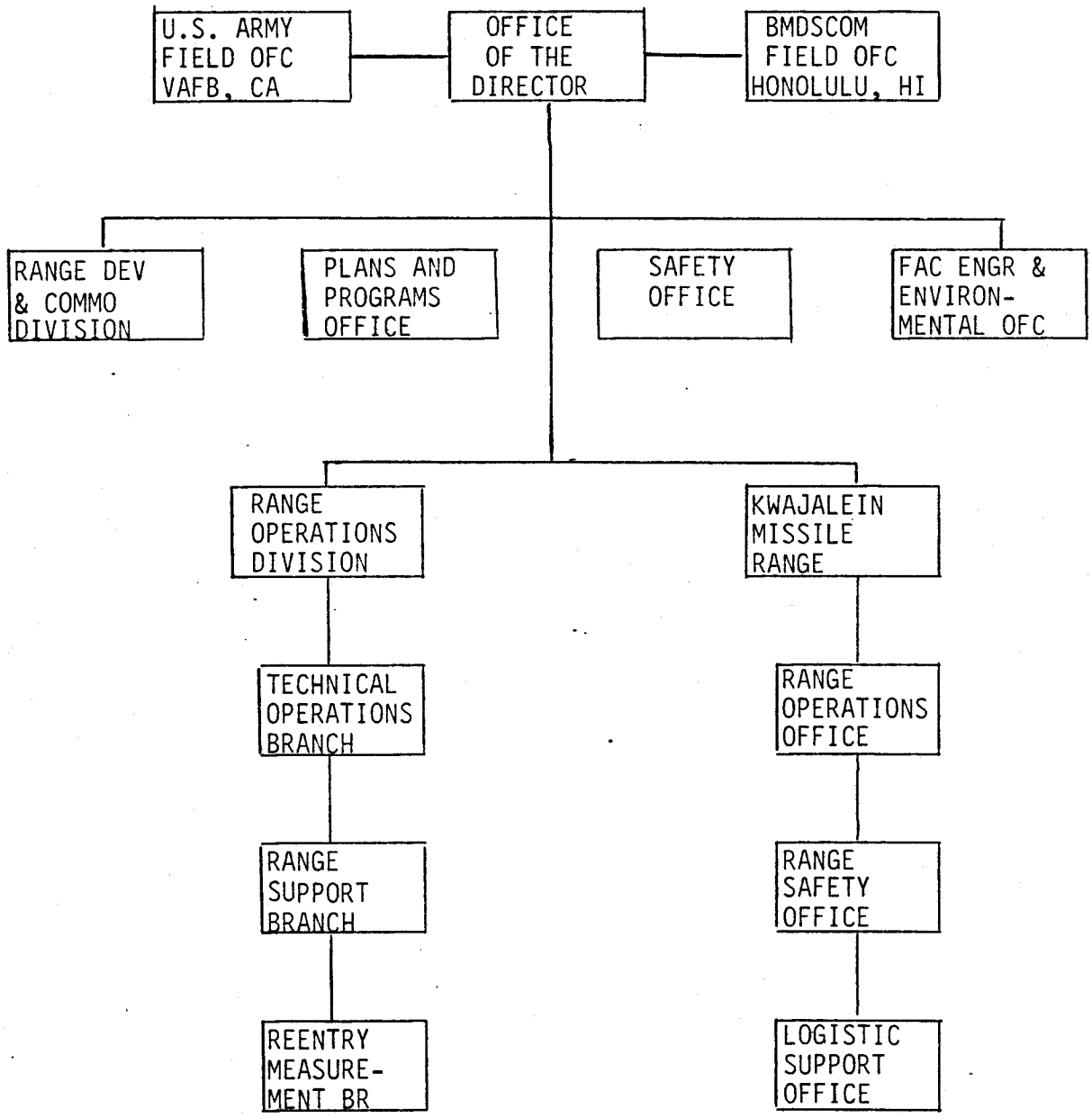


Figure 2 - Kwajalein Missile Range Directorate Organization

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	Plans and Programs Office
BMDSC-RS	Safety Office
BMDSC-RE	Facilities Engineering and Environmental Office
BMDSC-RO	Range Operations Division
BMDSC-ROO	Technical Operations Branch
BMDSC-ROS	Range Support Branch
BMDSC-ROM	Reentry Measurements Branch
BMDSC-RD	Range Development and Communications Division
BMDSC-RK	Kwajalein Missile Range
BMDSC-RV	U.S. Army Field Office, Vandenberg AFB, CA
BMDSC-RH	BMDSCOM Field Office, Honolulu, Hawaii

Table 1 - Office Symbols

PERSONNEL STRENGTH

	KMRD & FLD OFCS		KMR	TOTALS
30 Sep 77	MIL	8	20	28
	CIV	71	31	102
				130
30 Sep 78	MIL	7	20	27
	CIV	72	32	104
				131
30 Sep 79	MIL	7	20	27
	CIV	71	32	103
				130
30 Sep 80	MIL	7	20	27
	CIV	71	32	103
				130

Table 2 - Personnel Strength

KEY PERSONNEL

POSITION		
KWAJALEIN MISSILE RANGE DIRECTORATE OFFICE OF THE DIRECTOR		
DIRECTOR	COL ROBERT A PARSONS	Jun 78 -
DEPUTY DIRECTOR	MR. O.E. OVA	Jun 64 -
EXECUTIVE OFFICER	LTC JOHN J. KOISCH	Jun 79 -
CHIEF, U.S. ARMY FIELD OFFICE, VAFB	LTC QUINTON P. BOYD LTC JOHN S. MACK	Jul 77 - Jul 80 Jul 80 -
CHIEF, FIELD OFFICE, HONOLULU	LTC LOUIS J. PARISON LTC WALLACE R. NAPIER	Nov 74 - Jul 80 Jul 80 -
CHIEF, PLANS AND PROGRAMS OFFICE	LTC W. H. GRISWOLD MR. JOHN H. COTTEN	Apr 73 - Feb 80 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. H. R. BRASWELL	Sep 76 -
CHIEF, REENTRY MEASUREMENTS BRANCH	MR. MICHAEL HOLTCAMP	Sep 76 -
CHIEF, TECHNICAL OPERATIONS BRANCH	MR. ALVARO AMADOR	Jul 77 -
CHIEF, RANGE SUPPORT BRANCH	MR. REINHART LEO	Feb 71 -

Table 3 - Key Personnel

CHIEF, RANGE DEVELOPMENT AND COMMUNICATIONS DIVISION	MR. HARRISON MAXEY	Jul 76 -
KWAJALEIN MISSILE RANGE		
OFFICE OF THE COMMANDER		
COMMANDER	COL JOHN H. REEVE	Jun 78 - Mar 80 -
	COL PETER F. WITTERIED	Mar 80 -
DEPUTY COMMANDER	LTC MARTIN G. OLSON	Jul 77 - Jun 80
	LTC JAMES C. COOPER	Jun 80 -
CHIEF, RANGE OPERATIONS OFFICE	LTC JAMES ALLRED	Jun 78 -
CHIEF, RANGE SAFETY OFFICE	LTC JAMES C. COOPER	Jul 79 - Jun 80
	LTC ALVA SHRONTZ	Jun 80 -
CHIEF, LOGISTIC SUPPORT OFFICE	LTC ALBERT CAMPBELL JR	Jun 78 -

PROGRAM STATUS

AS OF 30 SEP 80

PROGRAM MANAGEMENT	$ 4.937
GOVERNMENT SUPPORT SVCS	11.862
MATERIALS AND SUPPLIES	18.307
CONTRACT SUPPORT	63.735
TOTAL	$98.841

(Figures are in millions of dollars.)

Table 4 - Program Status

KMR DIRECT SUPPORT REIMBURSEMENT

FY 80

Army	
BMD Advanced Technology Center	$ 2.462
BMD Systems Technology Program	7.359
Air Force	
Air Defense Command	.110
Space and Missile Systems Organization	.317
Electronic Systems Division (AFSC)	3.368
Western Space and Missile Center	3.063
Wright Patterson AFB	.200
Other	
OUSDR&E	.424
Defense Logistic Agency	.100
Defense Nuclear Agency	.060
NASA	.041
TOTAL	$17.504

(Figures are in millions of dollars)

Table 5 - KMRD Customer Funding

Chapter II

RANGE USERS

The Kwajalein Missile Range (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 80 is given below:

Army Programs

Ballistic Missile Defense Advanced Technology Center

The Army Optical Station (AOS) on Roi-Namur is an optical scanning and tracking facility designed to obtain infrared signatures and other characteristics from targets of opportunity. A Laser Radar (LITE) augments the optical system for collection of other experimental data. This program continually gathers and builds a data base of optical measurements and signatures from the multi-variety of reentry vehicles.

The Designating Optical Tracker (DOT) program experiments are designed to determine the ability of missile borne optical sensors to designate and track incoming reentry vehicles. During FY 80, KMR successfully supported missile launches associated with this program.

Multi-static 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. Considerable design and installation progress was achieved during FY 80 and engineering test data will be gathered during FY 81.

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. It will be used as a test bed for future BMD applications.

Air Force Programs

Advanced Maneuvering Reentry Vehicle (AMARV) is a sub-program of the Advanced Ballistic Reentry Systems (ABRES) for the purpose of obtaining maneuvering reentry technology. The AMARV missions used Minuteman I launch vehicles modified and refurbished to the configuration required under the Reentry System Launch Program (RSLP).

Advanced Ballistic Reentry Vehicle (ABRV) is also a sub-program of the Advanced Ballistic Reentry System (ABRES). The ABRV program is intended to provide accurate reentry system options for MX and TRIDENT II (D5) application and to validate these options by ground and flight tests. The purpose of the flight program is to assess reentry vehicle performance in the areas of accuracy, survival and subsystem(s) operation, dispersion contributors and model verification. The test program includes three flights in clear air and one flight in adverse weather.

The Reentry Environment Measurements Program (REMP), an ABRES program, obtains target area data on ABRES flights into KMR. Weather measurements are made with the objective of obtaining quantitative hydrometeor characteristics as a function of altitude. A variety of sensors are used to make these measurements in a time correlated fashion, so that comparisons and correlations can be made with the data obtained from the instrumented reentry vehicles carried by ABRES missiles. REMP supports the AMARV and ABRV missions. KMR successfully supported one ABRV flight and one AMARV flight in FY 80.

The HAVE JEEP program is a continuing program for testing payloads utilizing low-cost sounding rockets, launched locally, to simulate ICBM reentry. Launches are made from Roi-Namur Island. The HAVE JEEP V program for FY 80 consisted of two Sergeant/Hydac flights for testing MK 500 Penetration Aids.

The MINUTEMAN III Flight Test Program involves flight tests Production Verification Missiles (PVM). Reentry vehicles are targeted into KMR and require a full range of reentry measurements, scoring, telemetry, optical, and meteorological support.

The SAC MM II Operational Tests (OT) 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 data, telemetry and impact scoring by KMR.

The SAC MM III Operational Test Program has the same general objectives as discussed for the MM II OT above and requires the same KMR support. Vehicles targeted for land areas continued in FY 80.

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

In the Space Object Identification (SOI) Program, the KREMS radars, (TRADEX, ALCOR, and ALTAIR), respond to the operational requirements of the USAF spacetrack system during normal duty hours on a non-interference basis with other range requirements. Approximately 60 identifications per year are made.

A test of ALTAIR capabilities to support the Air Force's Space Detection and Tracking System (SPADATS) was successfully concluded in Feb 80.

National Aeronautical and Space Administration (NASA)

NASA is establishing a Mobile Laser Station (MOBLAS) on Roi-Namur to provide tracking and ranging data in support of the SEASAT-A Project which is part of the Earth and Ocean Dynamics Applications Program (EODAP). This is the first major step in developing and demonstrating a system capable of providing, from space, global monitoring of wave height and directional spectra, surface winds, ocean temperature, mapping of global ocean geoid, measuring precise sea surface topography, detecting currents, tides, storm surges, tsunamis, and charting ice fields and leads.

Defense Nuclear Agency

The Wide Band Equatorial Program was conducted with simultaneous measurements of the effects of ionospheric and transionospheric scintillation on satellite communications. Data were obtained for this program during August 1980.

Support is also provided DNA during their annual radiological surveys of areas formerly utilized as nuclear testing sites.

Missions

During FY 80, the Kwajalein Missile Range (KMR) participated in approximately 169 missions including 156 Earth Resources Support System (ERSS) and Defense Meteorological Satellite Program (DMSP) meteorological rockets launched from KMR, two Systems Technology Program (STP) missions, two Designating Opitcal Tracker (DOT) and nine Operational Tests. Major missions were:

21 Nov 79	Mission 3657, a TITAN III C satellite insertion mission. KMR provided telemetry and communication support.
14 Dec 79	Mission 0559, designated GT-139M, a SAC MINUTEMAN II operational test.

20 Dec 79	Mission 4980, designated AMARV-1 (Advance Maneuvering Reentry Vehicle-1, a BMO/ABRES research and development mission.
31 Jan 80	Mission 1767, designated PVM-18 (Production Verification Missile), a BMO metric and signature mission.
6 Feb 80	Mission 9039, designated GT-7 GM, a SAC MINUTEMAN III operational test with two reentry vehicles, served as target vehicle for DOT-3.
6 Feb 80	Mission 6877, designated DOT-3 (Designating Optical Tracker) an Army ATC Castor rocket launched from Roi-Namur.
21 Feb 80	Mission 4190, designated GT-72GB, a SAC MINUTEMAN III operational test consisting of three reentry vehicle with one targeted for land impact.
24 Feb 80	Mission 3355, designated GT-140M, a SAC MINUTEMAN II operational test.
27 Feb 80	Mission 2410, designated GT-73GM, a SAC MINUTEMAN III operation consisting of three reentry vehicles with one targeted for land impact.
15 Mar 80	Mission 0310, designated ABRV-3 (Advance Ballistic Reentry Vehicle-3), a BMO/ABRES research and development mission.
27 Mar 80	Mission 7434, designated PVM-19 (Production Verification Missile), a BMO metric and signature mission. The last of the PVM series.
11 Apr 80	Mission 1406, designated STREP-4, the third MINUTEMAN I in a series of four dedicated missions for the Systems Technology Program.
22 Jun 80	Mission 3557, designated GT-74GB, a SAC MINUTEMAN III operational test.
22 Jun 80	Mission 2116, designated Bullet Blitz VII, a SAC B-52 operation consisting of a SRAM (Short Range Attack Missile) launch and a BDU-38, bomb drop.

18 Jul 80 — Mission 4377, designated HAVE JEEP V, a BMO/ABRES Sergeant/Hydac launched from Roi-Namur. An R&D experiments testing of the MK 500 Pen Aid System one of a two mission series.

24 Jul 80 — Mission 7077, designated HAVE JEEP V, a BMO/ABRES Sergeant/Hydac launched from Roi-Namur. The second MK 500 Pen Aid Systems experiment.

20 Aug 80 — Mission 6993, designated GT-76GB, a SAC MINUTEMAN III operational test. A long range mission for which KMR provided limited support.

16 Sep 80 — Mission 7187, designated STREP-3, the fourth MINUTEMAN I in a series of four dedicated missions for the Systems Technology program. Target for DOT mission.

16 Sep 80 — Mission 7302, designated DOT-2 (Designating Optical Tracker), an Army Castor rocket launched from Roi-Namur.

17 Sep 80 — Mission 3772, designated GT-77GB, a SAC MINUTEMAN III operational test. This was a fly by mission no support provided by KMR.

24 Sep 80 — Mission 4320, designated GT-78GM, a SAC MINUTEMAN III operational test consisting of three reentry vehicles with one targeted for land impact.

Chapter III

PROGRAM & RANGE PLANNING

The range has continued to strive to meet the range user demands for accurate, quality data delivered to the data analyst in a punctual manner. This motivation, as well as being aware of the range users' needs to minimize test costs, has influenced KMR's planning for range modernizations and improvements. Also, more and more the range users of KMR are presenting a diversity of requirements which constantly exploit the operational procedures and applications of available resources. Program requirements included measurements on reentry vehicle experiments, aircraft, bombs, ionospheric/tropospheric efforts, orbiting bodies, air-to-ground missiles, and extended targets.

Planning continued for the BMD Homing Overlay Experiment (HOE) which will involve the launching of MM I class vehicles at KMR. The range is working closely with the HOE contractors (McDonnell Douglas Astronautics Company and Lockheed Missiles & Space Company, Inc.) to plan the proper interface and integration of the launch facilities with KMR instrumentation and facilities.

Planning has begun for the MK-500 PENAIDS Program which is a combined NAVY/ABRES effort to flight-test decoys and chaff. Two missions are planned, each with at least three sequentially reentering payloads. Because of various operational constraints, there will be a considerable amount of debris in the vicinity of the small decoy payloads. This presence of debris will cause difficulty for the radars to acquire, identify, and collect good data on the payloads; hence, the need for extensive planning to develop real time recognition schemes and contingency plans.

Planning was initiated for KMR's participation in the NASA Space Transport System (STS) (SPACE SHUTTLE) tests. The TPQ-18 and ALCOR radars were committed to support orbital tracking of the SHUTTLE while in view of Kwajalein, and transmit metric data back to Goddard Space Flight Center in near real time. KMR participated in numerous NASA, worldwide SPACE SHUTTLE data flow tests to ensure that a continuous flow of tracking data on the manned shuttle would be available.

Per agreements among BMDSCOM and SAC/ADCOM, the ALTAIR radar will become a contributing sensor to the US Air Force Space Detection and Tracking System (SPADATS). Some 128 hours per week will be devoted to SPADATS and the remaining time allocated to KMR range activities. To enhance its SPADATS function, numerous modifications were initiated in the areas of hardware, software, and communications. When operational, ALTAIR will perform these functions in its SPADATS' role: (a) Detection of New Foreign Launches, (b) Satellite Catalog Maintenance, (c) Space Object Identification, (d) Deep Space Surveillance.

During this period the tracking optics improvement program was enhanced with the delivery of two more SUPER RADOT systems. The SUPER RADOT offer numerous improvements over the original RADOT including: improved accuracy, extended range operations, and data recording on video tape vice film.

A Satellite Data Transmission System has been designed which will greatly increase the efficiency of transmitting KREMS radar data from Kwajalein to the data reduction facility at Lexington, MA. The utilization of a satellite data communications link will allow a substantial improvement in the delivery schedule of time-urgent data, and will enhance the efficiency with which mission anomalies are resolved and described to range users. The data flow will be between the Kwajalein Satellite Terminal and the New Boston, New Hampshire Satellite Terminal via the East PAC Satellite. Operation of the satellite link is anticipated for late FY 81.

Another major modification effort at KMR has been to implement a Multistatic Measurements System (MMS) at KREMS on Roi-Namur. This system consists of the TRADEX L-band and ALTAIR UHF radars as illuminators and bistatic receiving sites on two remote islands. The system will provide very accurate measurements during ICBM reentry vehicle testing and also bistatic signature data at UHF and L-bands. The metric measurement capability will provide a means of separating launch errors from reentry phenomenon errors for missile performance evaluation even when no onboard sensors are available. This system is under development and is expected to be operational during FY 82.

Chapter IV

REENTRY MEASUREMENTS RADARS

Modification to the Kiernan Reentry Measurements Site (KREMS) radars to provide better support to programs using Kwajalein Missile Range (KMR) continued during FY 80. The most significant modification work is summarized below.

KREMS Control Center (KCC)

A new Data General Ecllipse computer was installed to handle KCC displays. The existing display system had become overloaded and often lagged in real time during complicated missions. The new display system provides adequate capacity to handle all display tasks in real time. In addition, it provides a large degree of versatility for upgrading the present display configurations.

A Radar Cross-secton Target Identification algorithm was installed in the KREMS Real Time Program for mission operations.

ARPA Lincoln C-Band Observables Radar (ALCOR)

A major redesign of the ALCOR modulator was accomplished during FY 80. The new design replaces the old Machlett LPT-17 switch tube with the Varian L-5097 tube. This tube has been highly successful in the TRADEX transmitter system. Tests of the new ALCOR modulator design in the TRADEX high power test facility have provied successful. The new modulator will be installed permanently in the ALCOR transmitter during the next shutdown period.

Software was developed for a new disk recording system at ALCOR. This recording system is used in real time mission operation for mission data recording. It provides a much more reliable system than the previous tape drives. Data is retrieved from the disk system post-mission and converted to the standard ALCOR Data Tape computer format.

A rapid imaging capability is being developed for use at ALCOR. This system will provide data directly to the ADCOM headquarters in Colorado for immediate processing on special satellite missions.

ARPA Long Range Tracking and Instrumentation Radar (ALTAIR)

During FY 80, transmitter upgrades wre installed to meet the requirements of the ALTAIR SPADATS Modification (ASM). The higher power UHF mode was exercised and verified. A new 800 usec VHF waveform was also installed. This long waveform is used for search and acquisition of New Foreign Launches.

A wind data processing system was installed to reduce the amount of data that has to be recorded. This system greatly reduces the data processing load at Lexington.

Considerable work on the antenna was carried out in anticipation of the SPADATS operation. Many cracks and minor failures were identified and repaired. An analysis of future wear and required maintenance was performed.

Target Resolution and Discrimination Experiment (TRADEX)

Most of the work at TRADEX during FY 80 was pointed toward integrating the Multistatic Measurement System. Work has been carried out to upgrade the Coherent Signal Processor. The MMS remote site equipment was checked out at Roi-Namur and has been installed at Gellinam and Illeginni.

KREMS Communication

KREMS communication capabilities required for the Multistatic Measurement System remote sites (Illeginni and Gellinam), the ALTAIR SPADATS Modification, the High Speed Data Link, the ALCOR Rapid Imaging Link, and a secure facsimile system were all defined and agreed upon. These communication links are to be implemented during the coming year.

Chapter V

RANGE TECHNICAL FACILITIES

Photo Optics

Super RADOTs 4 and 5 were installed during the third quarter of FY 80.

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 SAMTEC's Canton Operating Location, in 1975. Disassembly of the radar at Canton Island began 18 Oct 75. The radar arrived KMR 6 Dec 75. Site construction was completed atop Launch Hill on Kwajalein Island and system installation began 26 Apr 75. Installation and check-out 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. Plans were made to develop and upgrade the receiving portion of the radar from vacuum tube to solid state technology. As part of the upgrade activity, the computer was replaced in FY 79 and is now fully operational. Other modifications will begin in 1981 and will be completed in 1983.

Meteorological Radar System

In FY 80 requirements were developed for a Meteorological Radar System to replace the antiquated WSR-57 Weather Radar at Kwajalein. These requirements will be formulated into a procurement package and released to the BMDSCOM Contracts Office for award of a competitive contract in FY 81.

Timing Systems

A Portable Time Measurement Unit (PTMU) was returned to the vendor for warranty service. The problem was corrected and returned to KMR. A specification for procurement of the second PTMU was prepared and the second PTMU was purchased.

A LORAN-C receiver and a WWV receiver were purchased for use in the Master Timing Center at KMR.

Radio Frequency (RF) Measurements System

The RF van upgrade continued, with the van configuration being defined and the van reconfiguration being completed. The market survey for the antenna system was completed. Procurement was initiated and completed on antenna system, spectrum analyzer, and disc memory.

Deterioration of the RF van floor was discovered and replaced by the vendor under a warranty program.

Data Handling Systems

A Data Communications Multiplexer (DCM) System, developed by Metric Systems Corporation, was delivered to KMR on 4 Mar 80. This system provides an improved and modernized interface between the Programmable Controller System (PCS) and the various remote instrumentation sites.

A contract was awarded to Science Applications, Inc. (SAI) for the development of an improved and modernized Status Display Console (SDC) at KMR. This unit will replace the existing SDC in the Instrumentation Control Center at KMR.

Range Instrumentation Systems Analysis

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 Range Instrumentation Systems Analysis (RISA) group under the direction of the Range Development and Communications Division. KMR instrumentation performance and data accuracy were monitored on a continuing basis resulting in consistently high KMR data quality for FY 80. 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 inputs to Program Support Plans were provided for direct response to Users.

To assure that high quality instrumentation is developed in the most efficient manner, the RISA group participates in all instrumentation development efforts as appropriate. Efforts of this type during FY 80 includes the Range Meteorological Sounding System test development support, Side Flash, and BOAST.

The analysis of raw data continued to be a source of insight into instrumentation characteristics. Raw data from the TPQ-18 and MPS-36 systems were analyzed to study monopulse data characteristics and exoatmospheric range data trends. Also, VMARS processing was analyzed.

Analytical studies were performed by RISA in many diverse instrumentation areas:

a. A critique was made of methods for surveying the implanted location of the lagoon-mounted sensors of the Hydroacoustic Impact Timing System.

b. A concept for a global position and attitude determining system was presented.

c. Geometric dilution of precision studies were performed for HOE scenarios, Multi-Target Instrumentation Radar location analysis, and Meteorological Sounding System simulation.

d. Other HOE-related studies included the accuracy of extrapolated TPQ-18 track, and the extent of RF attenuation by the booster flame.

e. Impact sensor studies included Splash Detection Radar accuracy reviews and transmitted power analysis, post-impact telemetry design, a measurement concept for the velocity of sound in the lagoon, a method to eliminate the requirement for velocimeters, and an impact system accuracy monitoring method.

f. Planning analysis was provided for SSTSS, Bullet Blitz, a GEOS satellite follow-on, and MX development testing support.

g. A detailed analysis of the method of calculating mislevel correction coefficients for the Super RADOTs was performed.

Chapter VI

RANGE SAFETY

The Range Safety mission is to insure that all reasonable precautions consistent with operational requirements will be 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 is the responsibility of the National Range Commander, who discharges this responsibility through the Director, Kwajalein Missile Range Directorate. 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 80, the following events occurred in the Range Safety area:

Strategic Systems Test Support Study - On 2 Oct 79, Dr. Denine, OUSDRE, tasked a tri-service study group to analyze future strategic offensive and defensive test requirements and to recommend the most cost effective approach, using fixed and mobile support resources, for midcourse and terminal area test support. The Major Range and Test Facilities Committee was briefed on the study approach on 17 Dec 79. Initial meetings were held at Vandenberg AFB, California on 19 Dec, but a budget cut in TDY funding forced a 6-week hiatus until funding arrangements and Air Force support could be assured. The week of 17 Mar 80 was spent at Vandenberg AFB reviewing potential user requirements, presenting current support capabilities, and defining additional test support requirements. The week of 21 April 80 was spent at Patrick AFB, Florida defining the major requirements drivers; identifying land-based options for support; identifying, analyzing and tasking studies to resolve support problems. On 4 Jun, the results of the Phase 1 study (strategic testing requirements and drivers for test support) were briefed to DDTE and the MRTFC. The balance of the year's activity was spent in studying aircraft and ship workload requirements and analyzing alternative support configrations for cost effectiveness. A briefing of these results and recommendations were presented to the user community on 16 Sep and to the DDTE and the MRTFC on 25 Sep 80.

Range Safety Group - KMR's member to the RSG was elected chairman of that group for a 2-year period in the fall 1979 meeting at Albuquerque, New Mexico. The RSG met in April 1980 at ESMC with tours and emphasis on Shuttle and TRIDENT safety programs. New tasks for (1) compiling an unguided rocket safety reference document and (2) investigating the potential for standardizing safety philosophies and criteria for multiple-range programs (e.g. ALCM) were undertaken. Also, the safety implications of range encroachment and changes to DODD 3200.11 safety paragraphs were discussed.

C-7A TASA - A study was initiated by KMRD, at the request of the Strategic Systems Test Support Study (SSTSS) group, to evaluate the feasibility of developing a Terminal Area Support Aircraft (TASA) using a C-7A Caribou aircraft positioned at KMR. The aircraft would collect terminal data at broad ocean impact points during MX and TRIDENT RDT&E testing. The KMRD Safety Office (RS) assisted that study effort in the form of an ad hoc committee member focusing on system safety design, range safety considerations, the overall operational scenario, and mission protection.

Sampling Program - During 1980, effort continued on development and execution of a monitoring program for assessing depleted uranium concentrations in the marine environment at KMR. This effort is aimed at assuring that no health or safety hazard exists because of depleted uranium being introduced into the lagoon on some test programs. Samples to be collected will include water, marine life, and sediment. The monitoring plan was completed in 1980 and the sample collection and analyses will be performed during 1981.

KRSS Certified - The Kwajalein Range Safety System (KRSS) was certified in October 1979. The KRSS supported missions of opportunity from October 1979 to June 1980 obtaining operational and reliability data.

Bullet Blitz VII - KRSS supported Bullet Blitz VII in mandatory status in June 1980. Bullet Blitz VII was the launch of Short Range Attack Missiles (SRAM) and bomb drops from B-52's at KMR. The mission was conducted approximately 3 months after go ahead was given for the mission. The short preparation time required Flight Termination System (FTS) support from White Sands Missile Range (WSMR). This support was provided by WSMR and the mission was completed with no known safety problems under the flight safety control of KRSS. This was the first mandatory mission for KRSS.

KRSS Upgrade - The upgrade of KRSS was begun in FY 80 with the purchase of two VAX 11/780 computers and two additional displays. These computers and displays were required to replace the PDP-11 and to give the KRSS a full redundancy that did not exist at that time. Software for the VAX 11/780 was started during FY 80.

HOE Debris Study - New concepts in missile BMD interceptor technology are to be tested at KMR in the 1980's for the Homing Overlay Experiment Program. The tests, which will consist of a non-nuclear kill vehicle intercept of an incoming ICBM reentry vehicle, could generate hazardous debris from the collision of interceptor and reentry vehicle. Because of the hazard to personnel and property that may arise from the intercept debris, a safety analysis was undertaken in 1979 to determine the hazardous footprints resulting from various intercept scenarios. Computer simulations of the breakup of the colliding target and interceptor and resulting debris velocities were developed. The computer models which were based to the maximum practical extent on available empirical data yielded hazardous airspace definitions for aircraft, hazardous ocean areas for ships, and identified land areas which may also be hazarded. Future plans are to continue updating the models as test data becomes available and to take necessary safety precautions to protect personnel and property during the conduct of the test program.

Chapter VII

MAJOR CONSTRUCTION ACTIVITIES

This chapter discusses the major construction activities for FY 80. This includes construction under MCA and RDT&E Appropriations, Plans & Programs.

Sewage Treatment Plant - Kwajalein Island

Funded for $6.943M in FY 80, the MCA Program provides for a modern primary and secondary treatment plant on Kwajalein Island and collection and treatment facilities - septic tanks on Roi-Namur Island. These facilities were completed in FY 80 and are now in compliance with EPA requirements.

Resize and Modernize Range Facility - FY 80 MCA

This FY 80 MCA project, funded at $2.6M, consists of a weather station addition, a new building for the TPQ-18 Radar Complex, an addition to the Launch Operations Control Building on Roi-Namur, Super RADOT facilities, and upgrading part of the Digital Microwave System (DMS).

Barracks Modernization, Kwajalein Island

This FY 80 MCA project will upgrade the largest bachelor housing facility (Pacific Barracks) on Kwajalein Island by providing increased privacy and additional space.

Homing Overlay Experiment (HOE)

a. Facility criteria for HOE construction was baselined in Nov 79 and a system established to control all future changes. All design was completed during this period and a total of four working group meetings were held to review criteria changes and design status.

b. Martin-Zachary was issued the contract to disassemble and prepare for shipment of the C-3 Access Stand at Cape Canaveral, FL. This effort was scheduled for completion in late CY 80.

c. Construction planning was completed so that all work would be under contract early in CY 81 with a Beneficial Occupancy Date (BOD) established 1 Oct 81.

Chapter VIII

BASE SUPPORT ACTIVITIES

General

The Kwajalein Missile Range (KMR) nonindigenous population was 2,935 at the end of FY 80 and is tabulated in Table 6, this chapter. This is 45 less than the population at the end of FY 79.

The Kwajalein Missile Range continued to consolidate facilities to ensure efficient utilization and to conserve energy. Intensive new efforts in this area were initiated in FY 80 with dedicated personnel assigned to guide the efforts.

Logistic Support

A new security contract (Contract DASG60-80-C-0102) was awarded on a competitive basis to Wshington Patrol Services for a two-year period beginning 1 October 1980.

A C-7A aircraft was obtained from Davis Monthan AFB, Arizona, to replace the aircraft that sustained major structural damage in an accident on Meck Island on 15 August 1979.

During FY 80, action was initiated to obtain three (3) C-7A aircraft in anticipation of converting to an all C-7A fleet. (The one remaining L-188 Electra is scheduled to cease operation in early FY 81.) The first of the three (3) C-7A aircraft requested was obtained from the Air National Guard at Groton, CT, in August 1980. The KMR fixed wing fleet now consists of one L-188 and five C-7A aircraft.

A preliminary BMDSCOM requirement for three (3) CH-47 helicopters to support the Broad Ocean Area Scoring and Telemetry (BOAST) was identified and efforts to obtain these aircraft were pursued at the Department of the Army level. No firm requirements for these aircraft developed and all actions to obtain them were terminated.

A Government Flight Representative (GFR) and Alternate GFR were appointed by the Contracting Officer in accordance with the provisions of AR 95-20. Duties of the GFR are to monitor, recommend/or approve the logistic contractor flight operations at KMR.

During FY 80, in support of DOT program, a Delong Barge was reconfigured to an ocean-going "platform" to assist in BMDATC DOT recovery operations. The platform accommodated helicopter crew BMDATC contractor personnel and various other expertises to support the mission.

Modification of the KMR marine vessels to comply with Environmental Protection Agency regulations began with the signed Memorandum of Understanding (MOU) between TSARCOM and BMDSCOM for installation of oil/water separators on the LCU's. MOU's for modification of KMR's tugs, barges and LCM-8's are expected in FY 81.

A marine assistance visit to review the logistic support contractor marine operations and the onsite licensing and certification of marine personnel was conducted by a representative from Ft. Eustis, VA.

A waiver of military customs inspections at KMR applicable to predeparture inspections of DOD aircraft, DOD-sponsored cargo, air passengers, crew members and accompanied baggage was requested by BMDSCOM and granted by HQDA.

Administrative Use Vehicles (AUV) allocated from FY 79 procurement actions were delivered to KMR during this period. FY 80/81 requirements were submitted to the US Army Tank-Automotive Materiel Readiness Command (TARCOM) and initial indications (based on DA severe budget constraints) were that allocations for FY 80 would be only 5.5% and for FY 81 would be only 10% of actual programmed requirements. Intensive management actions by both TARCOM and BMDSCOM have resulted in significant improvements in these projections. Based on past experience, the severe FY 80 budget cuts are anticipated to remain firm; however, allocations for FY 80 and FY 81 were increased to 44.1 and 7.7 percent, respectively. Twelve motor scooters were delivered to KMR and are being used to replace a like number of pickup trucks and carryall trucks currently in use at KMR. (A requirement for one additional scooter remains unfilled.) Future requirements for additional scooters will be based on results of a 6-12 month usage data study at KMR.

A Command equipment survey, consisting of a five-member DARCOM team and two members from this Command, was conducted during FY 80., All TDA equipment assigned was validated from a qualitative/quantitative standpoint during this survey. Several items were identified which were excess to KMR requirements and other items were identified which should be replaced with different models which would better satisfy requirements. A new TDA was approved based on the results of this survey.

The minimum AUV utilization program (implemented during FY 78) continued during FY 80 with the objective of minimizing and reducing, where possible, vehicle and equipment requirements at KMR. Data resulting from this program should continue to improve utilization of vehicles and should reduce total vehicle requirement.

The University of Hawaii, under contract to the KMR Logistic Support Contractor (LCS), completed a lens water study for Kwajalein Island. There appears to be an ample supply for the foreseeable future without the desalinization plant or the need of a reverse osmosis system. Additional lens wells could possible be installed rather rapidly if required.

"Megger" testing of the electrical distribution system was again performed by the Facilities Engineering Support Agency (FESA) and the results will be compared to that received on previous testing. This data will be used as a guide for developing a feeder replacement plan. (No cables were replaced during FY 80 due to lack of funds.) In addition, short circuit and protection coordination study was performed by FESA. Recommended relay settings for protective devices were received from FESA and the relays were reset. Also, an infrared survey of electrical systems was again performed by FESA and the splices/connectors showing "hot spots" were improved on.

The Energy Conservation Program, which began in FY 74, continued to progress during FY 80. Overall consumption was approximately 15% below that used in FY 79. Advice was received that the overall Army conservation goal for FY 80 was about one percent below the FY 79 fuel consumption. During the February-March time frame, KMR also exceeded the presidentially directed 10% reduction in AUV usage (compared to the same time frame in FY 79).

In July, the Corps of Engineers turned over to the LSC the new $6M sewage treatment plant for their operation. This is another action by KMR designed to improve the overall protection of the environment.

Disposal of the Meck Island complex technical equipment, which was initiated in FY 79, continued throughout FY 80. A number of excess items were transferred to other activities, to include two large power supplies, and several million dollars worth of precious metals were removed and returned to CONUS for reclamation.

During FY 80, an extensive review was made of the KMR Backlog of Maintenance and Repair (BMAR). As a result of this review, over $11M BMAR was identied with the major cause of concern being the primary electrical feeder system (over $5M), the sanitary sewage systems (over $1.3M), and the power plants (over $1.8M). This increase has been the result of both funding constraints and the extremely adverse KMR atmosphere (high temperature, humidity and salt content).

Efforts to upgrade the bulk fuel storage and distribution system continued during FY 80. The repair and modification of fuel tanks 1, 2, and 3 was completed and foam lines were installed in tanks 8 and 9.

The LSC completed facilities engineering projects during FY 80 totaling $164,000 for construction; $795,000 for repair; $148,000 for equipment-in-place; $47,000 for minor individual construction jobs; and $247,000 for range user technical support. Facility engineering projects approved during FY 80 included the replacement of the potable water filtration system, the repair of the saltwater cooling system in power plant #1, and the repair of the roof on the Meck power plant.

Major overhaul of the nine diesel engines in power plant #1 at KMR, which began in FY 79 (two overhauled in FY 79), continued in FY 80 with two additional engines being overhauled.

During FY 80, two prime movers at the Roi-Namur power plant failed. Replacement of the "short blocks" will involve an estimated cost of $130,000 each.

Fuel prices were essentially doubled (112% increase) at KMR (effective 1 February 1980) as a result of new prices established by DFSC, resulting in an impact of approximately $6,000,000 for FY 80.

KWAJALEIN MISSILE RANGE NON-INDIGENOUS POPULATION - 30 SEP 80

Kwajalein Island	
Commanding Officer, Kwajalein Missile Range and Staff	49
Systems Technology Program Contractor (MDAC)	57
Kiernan Reentry Measurements Site	132
Control Data Corporation	19
Pacific Ocean Division, US Army Corps of Engineers	6
Construction Contractor	85
Logistic Support Contractor	835
Technical Support Contractor	276
Defense Mapping Agency Topographic Center	2
Trust Territory of the Pacific Islands	2
Federal Aviation Agency	5
Defense Contract Audit Agency	1
Ballistic Missile Defense Operations Office	3
Department of Energy/Brookhaven National Laboratory	4
Dependents	1,131
Transients	33
SUBTOTAL	2,640
Roi-Namur Island	
Bendix Corporation	10
Logistic Support Contractor	146
Technical Support Contractor	6
Kiernan Reentry Measurements Site	77
Transients	3
SUBTOTAL	242
Ennylabegan Island	
Logistic Support Contractor	9
Technical Support Contractor	12
SUBTOTAL	21
Meck Island	
Logistic Support Contractor	10
SUBTOTAL	10
Ebeye	
Logistic Support Contractor	22
SUBTOTAL	22
TOTAL	2,935

NOTE: Employed dependents not shown.

Table 6 - KMR Non-Indigenous Population

Chapter IX

KMR RELATIONSHIPS WITH THE TRUST TERRITORY AND THE MARSHALLESE

KMR Interim Use Agreement

Negotiations between the Government of the Marshall Islands (GOM), DOD and DOI during the period Sep - Nov 1979, resulted in a signed KMR Interim Use Agreement (IUA). This IUA provided GOM's assurance of non-interference with KMR operations during the term (1 Oct 79 - 30 Sep 80) of the IUA. In return, DOD and DOI agree to provide additional funding and projects to the GOM during FY 80 totaling $7.23M. All DOD monetary obligations were met and no incidents of interference by the Marshallese with KMR operations occurred during the term of the IUA.

Future Political Status

A draft Compact of Free Association was initialed by representatives of the GOM, Federated States of Micronesia and Palau in early January 1980. Under the terms of this draft Compact the U. S. Government is to provide the GOM $19M annually for the first five years of the Compact, $15M annually for the second five years, and $12M annually for the third five years. This funding is to be provided to assist in efforts to advance economic self-sufficiency, and in recognition of the special relationships that exist gbetween the GOM and the United States. In addition, the U. S. Government is to provide the GOM $9M annually during the term of the Compact for operating rights at Kwajalein Atoll. The development and consummation of a Status of Forces Agreement and a Base Operating Rights Agreement (to become a part of the Compact) remained to be resolved.

CHRONOLOGY

JAN 80	Draft Compact of Free Association was initiated.
MAR 80	New Commander, Col. Peter F. Witheried, arrives at Kwajalein Missile Range.
JUL 80	New sewage treatment plant placed in operation.
AUG 80	Three additional C-7A aircraft are received at Kwajalein Missile Range

GLOSSARY OF ABBREVIATIONS (ACRONYMS)

ABRES	Advanced Ballistic Reentry System
ALCOR	ARPA Lincoln C-Band Observable Radar
ALTAIR	ARPA Long Range Tracking and Instrumentation Radar
ANT	Advanced Nose Tip
AOS	Army Optical Station
ARPA	Advanced Research Projects Agency
AUTOVON	Automatic Voice Network
BMDATC	Ballistic Missile Defense Advanced Technology Center
BMDSCOM	Ballistic Missile Defense Systems Command
BMDOPS	Ballistic Missile Defense Operations Office (KMR)
BMDSTP	Ballistic Missile Defense Systems Technology Program
CCT	Command Control Transmitter
DA	Department of the Army
DMSP	Defense Meteorological Satellite Program
DNA	Defense Nuclear Agency
DOD	Department of Defense
DOT	Designating Optical Tracker
ERSS	Earth Resources Support System
ETR	Eastern Test Range
FSM	Federated States of Micronesia
FY	Fiscal Year
GDOP	Geometric Dilution of Precision
GMD	Ground Measuring Device

HEAO	High Energy Astronomy Observatory
HITS	Hydroacoustic Impact Timing System
HOE	Homing Overlay Experiment
ICBM	Intercontinental Ballistic Missile
IRIG	Interrange Instrumentation Group
IRS	Interim Reentry System
ITTP	Interceptor Technology Testbed Program
KMMS	Kwajalein Multistatic Measurements System
KMR	Kwajalein Missile Range
KMRD	Kwajalein Missile Range Directorate
KREMS	Kiernan Reentry Measurements Site
KRSS	Kwajalein Range Safety System
LITE	Laser Infrared Tracking Experiment
LSC	Logistic Support Contractor
MCA	Military Construction, Army
MMS	Multistatic Measurements System
MOBLAS	Mobile Laser System
MSV	Miniature System Vehicle
NASA	National Aeronautics and Space Administration
PRB	Pacific Radar Barrier
PVM	Production Verification Missile
RADOT	Recording Automatic Digital Optical Tracker
RSC	Range Safety Center
RDTE	Research, Development, Test, and Evaluation
REMP	Reentry Environment Measurements Program

RF	Radio Frequency
RISA	Range Instrumentation and Systems Analysis
RMSS	Range Meteorological Sounding System
RV	Reentry Vehicle
SAC	Strategic Air Command
SAMSO	Space and Missile Systems Organization
SAMTEC	Space and Missile Test Center
SDR	Splash Detection Radar
SOFT	Signature of Fragmented Tanks
SOI	Space Object Identification
STM	Special Test Missile
STREP	System Technology Reentry Experiments Program
TDV	Technology Development Vehicle
TRADEX	Target Resolution and Discrimination Experiment
TREP	Thrusted Replica Decoy Program
TTPI	Trust Territory of the Pacific Islands
USAF	United States Air Force
UHF	Ultrahigh Frequency
VAFB	Vandenberg Air Force Base
VHF	Very High Frequency
VMARS	Video Metric Analysis and Reduction System