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MANUFACTURING METHODS AND TECHNOLOGY (MMT) PROGRAM FOR FY 80 LARGE CALIBER WEAPONS SYSTEM LABORATORY, ARRADCOM

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SEPTEMBER 1980



US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
LARGE CALIBER
WEAPON SYSTEMS LABORATORY
DOVER, NEW JERSEY

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18. SUPPLEMENTARY NOTES This project was accomplished as part of the U.S. Army's Manufacturing Methods and Technology Program. The primary objective of this program is to develop, on a timely basis, manufacturing processes, techniques, and equipment for use in production of Army materiel.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) MMT - Ammunition Program MMT - Weapons Program		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Manufacturing Methods and Technology (MMT) Program serves the U.S. Army Materiel Development and Readiness Command (DARCOM) as a link between research and development activities and production. The primary aim of the program is to reduce the cost of weapon systems acquisition by improving the efficiency of manufacturing processes and implementing new technology. Although cost reduction is a primary concern, emphasis is also focused on reducing air and water pollution, increasing safety, conserving energy, and reducing dependence on critical materials.		

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INTRODUCTION

The Manufacturing Methods and Technology (MMT) Program serves the United States Army Materiel Development and Readiness Command (DARCOM) as a link between research and development activities and production. The program is designed to reduce the cost of acquiring weapon systems by improving the efficiency of manufacturing processes and implementing new technology. Cost reduction is a primary concern, but reducing air and water pollution, increasing safety, conserving energy, and reducing dependence on critical materials are also emphasized.

The Army's production needs span the full range of modern technology, from the high speed production of millions of small arms to the forging of tank turrets and the production of integrated circuits. Product testing, material handling, and computer-aided design and manufacturing are all within the scope of the MMT Program.

This report presents an overview of DARCOM's Large Caliber Weapon Systems Laboratory, MMT Program for FY 80. It contains both the ammunition and weapons appropriations, broken down by responsible division and specific technical area supported.

The definition, scope, items supported, status, and funding are presented. Program management procedures, both internal and external, are also discussed.

The MMT Program Plan is an attempt to provide a single source summary of current and near-term efforts in the DARCOM MMT Program. Since weapon systems requirements and the technology for these systems are constantly changing, inclusion in the plan is not a guarantee that a program will be fully funded or completed. The MMT Program Plan, however, does serve as an indicator of the areas toward which DARCOM's resources will be directed and the magnitude of the Army's commitment to this program.

The MMT Program Plan contains a section for each element which has projects. Each section includes a summary of the activity, its responsibilities, and its major MMT areas. Following the summary is a listing of each project proposed by that activity.

DEFINITION AND SCOPE

An MMT project is one involving the evolution of manufacturing processes, techniques, and equipment by the Government or private industry to provide for timely, reliable, economical, and high quality mass production of DoD-required materiel. Its objective is to bridge the gap between prototype production and mass production by the application of practical new production processes or techniques. It is production oriented, accomplished on a production or pilot production scale, and is expected to result in a practical process for mass application. It does not normally include the application of existing processes, techniques, or equipment to the manufacture of specific systems, components, or end items and is not applicable to a specific weapon system development nor product improvement program (i.e., one which is undertaken to assure that a specific system, subsystem, or component is capable of mass production). Such effort will be normally funded as part of the specific program involved.

MMT projects expand manufacturing technology and translate new technology into practical production processes. They provide advanced manufacturing techniques and processes to support modernization of the industrial base. MMT projects are production-oriented and are expected to result in a practical process for production. They may reduce procurement lead time and costs, provide state-of-the-art production processes and techniques, investigate alternative methods of manufacturing components which limit production (cause bottlenecks), develop new and/or improved processes to facilitate competitive procurement, and/or ensure economic availability of end items. In exceptional cases, they may establish prototype production lines. MMT projects may involve technical or management studies that are related to timely establishment and improvement of manufacturing processes or techniques. These projects have a corollary effect by stimulating and encouraging increased productivity by private industry.

MMT Requirements

The criteria used to select projects for MMT financing are described below:

1. Each project will satisfy a requirement, current or anticipated for specific manufacturing techniques. Future requirements, normally qualitative in nature, will be directed toward the development of manufacturing technology which will increase general productivity.

2. Solutions to the problem will not be available on a timely basis from other programs in either Government or private industry.

3. Feasibility of the effort will have been sufficiently demonstrated by research or laboratory work.

4. The program will create new, significantly improved, or more economical manufacturing processes, techniques, or equipment rather than merely employing existing processes, techniques, equipment or facilities.

5. The program will result in one or more of the following:

a. An improved responsiveness to current and projected requirements.

b. A more effective and efficient industrial base that will reflect modern manufacturing techniques.

c. A cost effective manufacturing technique or process which will ensure economic availability of end items.

d. Enhance safety or anti-pollution measures to meet statutory requirements.

6. The application of the resulting processes, techniques or equipment is generic in nature, i.e., applicable to more than one end item.

Private industry will be encouraged to undertake with its own capital as much of the manufacturing technology effort as possible. When qualified segments of industry will not commit private capital and the program is needed to support Army requirements on an economic and timely basis, then (and only then) will Procurement Appropriation funds be allocated.

To ensure timely MMT developments responsive to Army requirements, process controllers [excluding general purpose automatic data processing equipment (ADPE)] and allied equipment used solely in the manufacturing process will become an integral and inseparable part of the industrial base. Benefits derived from the MMT program, e.g. reduced manufacturing and end-item costs and reduced production lead time, will be such that the program must be actively pursued to optimize the results. MMT projects should be initiated whenever the technical opportunity becomes manifest. MMT

projects which may benefit end items which will be funded initially by Procurement Appropriations should be started in sufficient time to be used in establishing the Initial Production Facilities.

Program Monitoring

Monitoring the MMT Program consists of both formal reports mandated by regulation and informal Laboratory meetings to review specific projects.

Semi-Annual Report

AR 700-90 requires that semi-annual project reports be submitted until the project has been either completed or terminated, at which time the report is considered final. All reports are bound into a series of books for Government distribution and incorporated into a data bank maintained for IBEA. The format for the report is included in appendix A.

Presentation

Approximately every six months, the Munitions Production Base Modernization Agency (MPBM) is briefed on selected projects. Four charts are prepared to MPBM's prescribed format and the presentations are sharply focused on the charts' data. A lengthy technical discussion is not required, but accomplishments and problem areas, as well as the funding status are looked at closely. The charts (app B) consist of:

1. Key Project Information
2. Milestone Schedule
3. Financial Status

Computer Program

Three computer programs (app C) have been developed within the LCWS Laboratory for internal management. These consist of:

1. MMT projects broken down by responsible Division, engineering starting date, and funding distribution.
2. Obligation status of contracts, OGA, and GOCO funds for FY 79 and FY 80.
3. Milestones and monthly starting and completion schedules. Examples of each are inclosed in appendix C.

Additional sources such as the RADMIS Data Bank in System 2000 form and the APARS Report from ARRCOM can be used to extract data on the project status.

Regulations

The regulations governing the MMT program consist of:

1. AR 700-90, Logistics
2. Army Industrial Preparedness Program
3. AR 32-100

MMT AMMUNITION PROGRAM

Background

The Ammunition Program spans the technology gap, particularly in those areas which have no counterpart in private industry. Almost all current manufacturing processes involve manual operations which must be efficiently automated. Batch processes must be converted to continuous processes to accommodate new materials-handling techniques and improve safety.

The Ammunition Program presents unique problems which require innovative solutions. New systems must be capable of economic layaway for periods of ten years or more, a stipulation which is rare in private industry. Manufacturing technology is the foundation of the modern ammunition production facility, whether it is derived from industry or developed through Defense supported projects.

The primary objective of the MMT Program is to improve existing manufacturing processes, techniques, and equipment. The second objective is to bridge the gap between development and full-scale production. The third objective is to solve technological problems.

Current planning requires that, in the event of mobilization, production facilities be activated within three months and reach maximum production in four. This objective requires that equipment design, layaway techniques, and control technology be oriented to achieve the quick-reaction capability desired.

Through advances achieved in automated inspection techniques, loading systems, and assembly systems, the uniformity and quality of the end product has been improved. The munitions MMT program includes several projects oriented toward improving quality control and test technology, and others toward development of explosive loading and assembly techniques and equipment.

MMT projects must be cost effective within the framework and economics of the Five Year Defense Plan. This presents a unique fiscal management challenge in the design and fabrication of equipment and systems required for the loading and assembly of components and end items. This challenge is being met by developing systems with the flexibility to produce any items, establishing an optimum balance between system simplicity and process operational requirements, and providing equipment designs capable of high efficiency operation to achieve cost effective system operations.

Technical Areas

LAP

The MMT effort in the Load, Assemble and Pack (LAP) area is guided by four major program goals: improved economy of operation, improved safety of operating personnel, establishment of a rapid response production capability, and improvements in the quality of the end product. All of these goals must be accomplished within the standards and criteria established for pollution abatement and energy conservation.

Safety

Due to the inherently hazardous nature of munitions production, an extensive program has been undertaken to upgrade the safety of explosive preparation equipment, loading equipment and assembly systems. The MMT program relating to the upgrading of the operational safety of loading lines is a continuation of current efforts. This program will define and investigate specific operational safety hazards and develop equipment and systems to reduce operator exposure and risk.

Metal Parts

The Metal Parts MMT Program has as its goal optimization of manufacturing processes. Projects are included for improving maintainability and readiness through computer integrated manufacturing, computer-aided modeling of forming operations, and storage techniques for production machinery. Enhancing reliability and quality control efforts include analysis for predicting tool failure, improving projectile surface quality, and processing high-frag steel.

Additional Emphasis

Primary program emphasis in energetic materials is being placed on the development of manufacturing technology for new munition items. Recent enactment of the Clean Air Act Amendment and Toxic Substances Control Act has resulted in the requirement for continuous MMT effort to meet mandatory compliance dates. Conserving production base utilities, energy and resources, as well as identifying and using alternate energy sources, are the broad areas of major concern. The development and design of safe, cost effective production processes are major goals of the munitions MMT program. In the supportive technology areas, the primary thrusts continue to be pollution abatement engineering, energy technology development, and explosives and occupational safety.

MMT AMMUNITION PROJECTS

ARRADCOM's FY 80 MMT ammunition projects are itemized in table 1 and discussed below. The specific Division in the Large Caliber Weapon Systems Laboratory responsible for each project is also identified in table 1.

Table 1. FY 80 MMT ammunition projects

<u>Responsible LCWSL division</u>	<u>No.</u>	<u>Project</u>	<u>Cost (\$K)</u>
Energetic Systems Process Division (EPSD)	4000	MMT: Automated M55 Detonator Production Equipment, LAP	250
	4062	Automated Manufacture System for Mortar Increment Containers, LAP	895
	4137	Automated Loading of Center Core Igniters, LAP	67
	4236	Automated Lace Jackets for Center Core Charges, LAP	612
	4312	Injection Molding for Pro- duction Explosive Loading, LAP	279
	4469	Automated Insertion of Grenade Layers, LAP	350
	4027	Combined Solvent Recovery /Drying of S-B Propellant, P&E	236
	4033	Caustic Recovery from Sod- ium Nitrate Sludge, P&E	153
	4037	Process Improvement for Plastic-Bonded Explosives, P&E	236
	4061	Nitroguanidine Process Op- timization, P&E	260
	4200	TNT Crystallizer for Large Caliber Munitions, P&E	29
	4210	Jet Cutting of Energetic Materials, P&E	450

Table 1 (cont)

<u>Responsible LCWSL division</u>	<u>No.</u>	<u>Project</u>	<u>Cost (\$K)</u>
ESPD (cont)	4310	DMSO: Recrystallization of HMX/RDX, P&E	278
	4341	Improved Nitrocellulose Puri- fication Process, P&E	583
	4462	Modified FAD for Multi-Base Propellant, P&E	850
	4508	Process Improvement of Pressable RDX Comps, P&E	506
	4285	TNT Equivalency Testing for Safety Engineering, Safety	408
	4288	Explosive Safe Separation & Sensitivity Criteria, Safety	767
	4291	Blast Effects in Munitions Plant Environment, Safety	100
	4281	Conservation of Energy at Army Ammo Plants, Conserva- tion of Energy	1234
	4225	Red Water Pollution Abate- ment System, Pollution Abatement	155
	4226	On-Line Monitors for Water Pollutants, Pollution Abatement	100
	4231	In-House Reuse of Pollution Abated Waters, Pollution Abatement	250

Table 1 (cont)

<u>Responsible LCWSL division</u>	<u>No.</u>	<u>Project</u>	<u>Cost (\$K)</u>
ESPD (cont)	4309	Ammunition for 120mm Tank Main Armament	3726
Applied Sciences Division	4322	Design Criteria and System Characterization of Elec- tronically Controlled Pro- duction Facilities	502
Nuclear and Fuze Division	4266	Manufacturing, Inspection & Test Equipment for Mag- netic Power Supply, Fuze	345
Munitions System	4084	Opacity/Mass Emission Cor- relation, P.A.	111
	4189	High Fragmentation Steel Pro- duction Process, MPTS	1048
	4498	Develop Method for Consoli- & Auto Assy of SmallMines, LAP	392
	6736	Technical Readiness Accel erated Through Computer Integrated Mfg (TRACOM) CD/CIM, MPTS	315
	6738	Ultra High Speed Metal Re- moval, Artillery Shell, MPTS	297

4000 - MMT: Automated M55 Detonator Production Equipment (LAP)
(\$K250)

This is a production engineering measure to develop an automated M55 detonator production capability which will also be adaptable to the production of other initiating devices.

Items Supported

Cartridge, 40 mm: HEDP, M433
Projectile, 155 mm: HE(ICM), M483A1
Projectile, 8 in.: ICM, M509
Detonator, Stab: M55
(Air Force items) CBU2, 25A/A, 46/A, 52/B and 71.

The XM14E6 ADEN/DEFA FA fuze requires a detonator which may be produced on the multi-tooled loader.

Present Status

This is the 10th year of a multi-year project. At the conclusion of this project, an operating prototype will be available for the basic multi-tool loader, automated detonator cup and assembled detonator inspection equipment, automated packaging and pack-out equipment, the automated explosives resupply system, improved powder metering and dispensing devices, an auto-mated detonator painting mechanism, and an improved vacuum system. In addition, final technical reports on the development efforts, RAM data and analysis, and drawings and specifications suitable for the follow-on procurement of equipment will be provided.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
71	333
73	396
74	549
75	100
76	1000
7T	250
77	1000
78	1250
79	1600
81	604 (Tentative)

4062 - MMT: Auto Manufacture System for Mortar Increment
Containers (LAP) (\$K 895)

This program will develop an automated system for manufacturing 60 mm M204 and 81 mm M205 propelling charge increment containers. A complete TDP for an automated manufacturing process will be provided enabling the Army to establish mass production capability at either private or GOCO facilities.

Items supported

Cartridge, 60 mm: HE, F/LWCMS, M720
Cartridge, 81 mm: M374A3
Cartridge, Smoke, 81MM: WP, M375A3
Charge, Propelling, 8 in.: WB (Zone 9), M188

Present Status

This is the second year of a three year program. The end products of this project are a pilot production system for manufacture of 60 mm M204 and 81 mm M205 propelling charge increment containers, equipment drawings to complete this system as a prototype and procure additional systems, a complete TDP, hazards analysis, production qualification and technical reports.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	507
81	330 (tentative)

4137 - MMT: Automated Loading of Center Core Igniters (LAP)
(\$K67)

This project will automate the loading operations of the 155mm M203 and the 8-inch M188 propelling charge igniters with black powder.

Items Supported

Charge, Propelling, 155mm M203
Charge, Propelling, 8 in. M188

Present Status

This is the second year of a two-year program. The end products of this project are a prototype loading machine, a technical data package, including requirements for quality acceptance, and a final technical report.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
FY 79	\$205

4236 - MMT: Auto Lace Jackets for Center Core Charges (LAP)
(\$K 612)

Large propelling charges such as the 155mm and 8 in. employ laced jackets to maintain their configurations. The manual threading and tightening of the lacing is a time consuming operation which results in poor quality, non-uniformity, high cost and personnel hazards. The automation/mechanization of the lacing operation would improve quality and greatly lower production costs and hazards.

Items Supported

Charge, Propelling: 155 mm, XM203
Charge, Propelling: 155 mm, XM201 and M119A1
Charge, Propelling, 8 in.: M188

Present Status

This project will result in a prototype production machine with appropriate installation, operation and maintenance manuals for use at an x-facility. Also provided will be a complete set of fabrication drawings and purchase and performance specifications in order to replicate the machine as required. A summary engineering report will provide full developmental data including performance tests, RAM data and hazards analysis.

4312 - MMT: Injection Molding for Production Explosive Loading (LAP) (\$K 279)

This program is intended to develop an injection molding process that will provide an alternative to melt loading of small caliber munitions. The injection molding system will eliminate the

large quantities of riser scrap generated by the current melt loading process. The results of this project will be used to define the base line requirements of an automated injection molding system for on mass production of small caliber munitions on LAP lines.

Items Supported:

BLU 61A/B
BLU 63B
BLU 86
BLU 66B

Present Status

This is the second year of a two-year program.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	\$261

4469 - MMT: Automated Insertion of Grenade Layers (LAP) (\$K 350)

This project covers development of an automated system for assembling grenade layers in the M483 ring pack and includes a prove-out plan, preliminary acceptance testing at the contractor's facility, shipment of the equipment to the GOCO, installation and final acceptance testing at the GOCO, preparation of all manuals, and completion of the technical data package.

Items Supported:

Projectile, 155mm: HE, M483A1
Projectile, 8 in.: HE, M509E1

Present Status

This is the last year of a three-year program. The end products of this project will be a component ring pack assembly equipment for M42/M46 grenades contained in the M483/M509 projectiles and automated prototype production equipment which will insert these grenade layers into the M483 projectile and perform all required inspections. In addition, technical data packages for the manufacture of replicate systems will be completed along with a hazards analysis, operation and maintenance manuals and final

reports. Design features which will permit the addition of tooling for the M509 projectile will be included.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
78	\$ 502
79	\$1150

4027 - MMT: Combined Solvent Recovery/Drying of SB Propellant (P&E) (\$K 236)

This project will establish equipment and methods for a combined solvent recovery/drying process with a rapid steeping-water drying method and the use of dehumidified air with partial recycle in the air drying operation.

Items Supported

All single base, solvent-type propellants which are dried with heated air at Radford AAP and at other Government installations. Prominent examples are:

Charge, Propelling, 175mm: WB, M86A2, M6MP Propellant for
Charge, Propelling, 155 mm: WB, M4A2, M1MP Propellant for
Charge, Propelling, 8 in.: M1, M1SP Propellant for

Present Status

This is the first year of a two-year program.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	\$383 (tentative)

4033 - MMT: Caustic Recovery from Sodium Nitrate Sludge (P&E) (\$K 153)

The objective of this project is to thermally convert sodium nitrate, formate, and acetate to the oxide which, upon hydrolysis, forms the hydroxide with the evolution of large quantities of heat.

The heat evolved can be used in various phases of production and the hydroxide reused to neutralize the excess nitric acid.

Items Supported

All items containing RDX/HMX and composition explosive thereof, such as

Cartridge 165 mm: HEP
Projectile, 155 mm: HE, ADAM
Rocket, 66 mm: HEAT, 1 LAW (VIPER) Mine, Ground Emplaced, Scatter, AP, XM74

Present Status

This is the first year of a three-year program.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	\$282 (tentative)

4037 - MMT: Process Improvement for Plastic-Bonded Explosives (P&E) (\$K 236)

This project will generate complete design criteria for processes adaptable to the manufacture of PBX compositions at mobilization levels. This project will include the investigation of present processing methods, as well as the application of new technology to coating, drying, and furnishing PBX compositions.

Items Supported

Warhead Guided Missiles
Torpedo Warheads
Burster Charges
Boosters
SOFAR Sound Signal Assembly

Present Status

This is the first year of a three-year project.

4061 - MMT: Nitroguanidine Process Optimization (P&E) (\$K 260)

This project will provide: improved operating conditions; proposed modifications to the existing facility; improved design for future plants; plant operating personnel trained in evolutionary operation; and a functioning EVOP for continued process improvement. Application of EVOP techniques will lead to reduced pollution and energy consumption and more economical operation while maintaining product quality and production requirements.

Items Supported

<u>Prop type</u>	<u>Chg No.</u>	<u>Systems</u>	<u>Code</u>
M30	M490	105mm	A
M30	M353A11	90mm	A
M30	M452A1	105mm	A
M30	M431	90mm	A
M30A1	M203A1	155mm	A

Present Status

This is the first year of a multi-year project. The end products will be applied to existing and future nitroguanidine plants. The EVOP technique may be applied to other facilities.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	\$953 (tentative)

4200 - MMT: TNT Crystallizer for Large Caliber Munitions (P&E)
(\$K 29)

This program will develop a continuous TNT crystallizer system for processing slurry of molten TNT containing up to 20% solids. The system will have the capability to closely control the percentage of solids incorporated into the molten TNT and the temperature of the explosive prior to the pour operation. This system will also eliminate double probing and top off operations which are required for processing TNT on a batch basis. The project will identify new crystallizer systems. Process parameters will be defined for the Army's alternate preferred filler in high-explosive loaded artillery ammunition.

Items Supported

Projectile, 155mm, HE: RA, M549A1
Projectile, 155mm, HE: XM795
Projectile, 8 in., HE: M106
Projectile, 8 in., HE: RAP, M650

Present Status

This is the first year of a two-year program. The result of this PEM program will be used to define the procedures for processing TNT explosives on a continuous basis in the melt-pour system for mass production LAP Lines.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
FY 81	\$448 (tentative)

4210 - MMT: Jet Cutting of Energetic Materials (P&E) (\$K 450)

This project will include the procurement, installation, and evaluation of an optimum jet cutter comprised of several components. Auxiliary safety interlocks, sprinkler protection, safety fire doors, and feed and take-away conveyor systems will be designed and debugged. Use of common drying trays is planned to reduce the number of operations. Strand chipping will be greatly reduced, probably eliminating hand sorting. Redrying will be minimized or eliminated. Elimination of these time consuming hand operations will result in cost savings. The proposed process will be inherently safer than the existing process, since it is conducted remotely and the sharpness of the "tool" is no longer a factor.

Items Supported:

Cartridge, 105 mm, APDS-T: M728/M392A2
Cartridge, 105 mm, TP-T: M490
Cartridge, 105 mm, TPDS-T: M724A1
Cartridge, 105 mm, APFSDS-T: M735
Cartridge, 105 mm: M119

Present Status

The end products of the program are a prototype jet cutting facility for benite production. In addition, a final report will be issued which will include a hazard analysis study, the results

of acceptance and non-ballistic qualification tests of a pilot lot of benite, and a summary of findings of reliability, acceptability, and maintainability (RAM) studies.

4310 - MMT: DMSO Recrystallization of HMX/RDX (P&E) (\$K 278)

Dimethylsulfoxide (DMSO) has significantly greater solvating power than the presently used solvents, cyclohexanone and acetone, and, therefore, can be used very efficiently in recrystallizing large quantities of RDX and HMX in minimal time, by yielding a significantly greater throughput of product. From preliminary results and analysis of laboratory-produced material, DMSO recrystallized RDX and HMX crystals are chemically and physically equivalent to those obtained with the presently used production solvents. Work to be conducted under the FY 80 segment of this multi-year funded project will involve interim qualifications, loading studies, and end item testing of explosives formulated from DMSO-recrystallized RDX/HMX produced in HSAAP's pilot-scale continuous recrystallization plant.

Items Supported

All end items containing RDX and/or HMX, or compositions thereof, of which the following are examples:

Projectile, 155mm, HE, ICM, ADAM: XM731
Cartridge, 165mm, HEP
Rocket, 66mm, HEP
Rocket, 66mm, HEAT: ILAW (VIPER)
Mine, Ground Emplaced, Scatter, AP: XM74

Present Status

This is the last year of a six-year program. The end product is a pilot plant for the development of improved recrystallization procedures to be built at HSAAP. A Technical Data Package will be generated by ARRADCOM and Holston AAP.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
75	465
76	400
77	200
78	196
79	483

4341 - MMT: Improved Nitrocellulose Purification Process (P&E)
(\$K 583)

This project will evaluate the prototype equipment in the poaching and acid boil operations. The production of pilot lots followed by ballistic evaluation will be made. Process design criteria will be established and the final report prepared.

Items Supported

Nitrocellulose and all single- and multi-base propellants.

Present Status

This is the last year of a four-year project. This project will provide preliminary design criteria for modernized purification processes and a technical report detailing results, hazards analysis, RAM assessment, Quality Assurance Plan and a prototype 2000 lb/hr continuous purification process. This work will be implemented in follow-on facility projects.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
77	165
78	664.9
79	742
81	765 (tentative)

4462 - MMT: Modernized FAD for Multi-Base Propellants (P&E)
(\$K 850)

Prior funding for this project provided for an engineering data review, hazards analysis, quality assurance, procurement of prototype equipment, building modification, process data acquisition, and installation and evaluation of equipment. This funding will provide for additional equipment, procurement, installation and evaluation, preliminary facility design criteria, documentation and final report and Control System Functional Criteria.

Items Supported:

<u>Propellant</u>	<u>Round</u>	<u>System</u>
M30A1	Cartridge, 155 mm: M203A1	105 mm Gun
M26E1	Cartridge, 152 mm, TP-T: M411A3	152 mm
M330HBD	Cartridge, 105 mm, HEAT-T (FFAIS): M456A1E2 and M496	105 mm Gun
M30	Cartridge, 105 mm, HEAT-T (FFAIS): M456A1	105 mm Gun
M30MOD	Charge, Propelling, 8 in.: XM188E3	8 in. Howitzer

Present Status

This is the last year of a four-year program. End items of this project will be technical reports, test data, prototype equipment, technical data package and preliminary design criteria, including Control System Functional Criteria for modernizing other forced air drying houses.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
77	163
78	592
79	528

4508 - MMT: Process Improvement of Pressable RDX Compositions (P&E) (\$K 506)

This project will generate complete design criteria for incorporation of facilities with processes sufficiently adjustable for the manufacture of pressable RDX compositions (A3, A4, A5) at mobilization levels. This project will include the investigation of present methods of incorporating RDX compositions.

Items Supported

All items containing pressable RDX compositions, of which the following are examples:

- Projectile, 8 in.: HE
- Projectile, 155mm: HE, RAP
- Cartridge, 20mm: All Types
- Cartridge, 165mm: HEP
- Rocket, 66mm: HEAT-T

Present Status

This is the last year of a three-year project. The end results will include a final technical report containing all the results gained from this project and sufficient engineering information to design new improved production facilities and a complete description of new methods, equipment, and technology for processing these explosives.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
78	300
79	357
81	263 (tentative)

4285 - MMT: TNT Equivalency Testing for Safety Engineering
(Safety) (\$K 408)

The only currently available design criteria for structures which can resist the effects of HE explosions is based on surface bursts of hemispherical TNT. When designing a structure to withstand the blast output of some other energetic material or charge shape, the designer must be able to convert the loading given in the TNT design manual into information which is pertinent for the material in question. Testing to generate peak pressure and positive impulse data from blast measurements of a variety of high energy materials (propellants and explosives) will solve this problem. These results will be compared with the blast output of surface bursts of hemispherical TNT in order to determine the TNT equivalency of the material. Work to be performed under this project includes: analytical studies, test plan development, testing, evaluation, and safety echelon approval of the TNT equivalency of various high energy materials (propellants and explosives).

Items Supported

This project is applicable to explosives, propellants, high-energy systems and munition end-items (projectiles, warheads, fuzes, missiles, etc.).

Present Status

This project is in the sixth year of an eight-year program. The end products are: TNT equivalencies, design data, test methods, and technical reports.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
76	325
7T	81
77	377.6
78	394.6
79	420
81	441 (tentative)

4288 - MMT: Explosive Safe Separation and Sensitivity Criteria (Safety) (\$K767)

Tests will be designed for various explosives and explosive end items and the results will be used to establish:

1. Safe separation distances for explosives, end items, and in-process materials.
2. Critical and safe depths of bulk explosives on a conveyor or storage vessel.
3. Sensitivity of explosives at various stages of the manufacturing process to primary and secondary fragment impact.

The program involves test plan development, testing, test data evaluation, and report preparation prior to modifying regulatory documents.

Items Supported

This project is applicable to the manufacture of all explosives, propellants, and explosive end items.

Present Status

This is the sixth year of a seven-year program. The data generated, with safety echelon approval, will be used to modify or supplement present regulatory manuals TM 5-1300 and AMCR 385-100.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
76	592.8
7T	139.3
77	600
78	816.3
79	643
81	720 (tentative)

4291 - MMT: Blast Effects in the Munition Plant Environment (Safety) (\$K 100)

This project is divided into two tasks. In Task 1, Blast Effects and Loadings, the characteristics of the blast environment which affect a structure's response are studied. In Task 2, Structural Response and Design, the response of various structural materials and elements subjected to the loadings determined in Task 1 are determined. This project will facilitate the design of blast resistant protective structures.

Items Supported

This project is applicable to all explosives and explosives-like hazardous materials, manufacturing, LAP and storage facilities. The following near-term projects will be supported:

- Project 823142W, Mississippi, 155 mm: LCM Complex
- Project 83B043, Government Facility, 30 mm: GAU-8 Cartridge, equipment and building
- Project 833556, Government Facility, 155 mm/8 inch, 3D Propellant Charge Bog LAP
- Project 83B053, Sunflower, AAP Projectile, 155 mm, RAP: M549
- Project 832607, Badger AAP, Semi-Auto single base line
- Project 83B053, Holson AAP, Granular Composition B
- Project 832665, Radford AAP, Continuous NC MFG Unit

Present Status: This is the fourth year of a five-year program. The end product of this project will be design guidance and construction techniques that will establish a capability to design acceptable structures that will provide protection to workers from blast and fragment damage resulting from an accidental explosion at an ammunition plant.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
76	700
77	350
79	235

4281 - MMT: Conservation of Energy at Army Ammunition Plants (Conservation of Energy) (\$K 1,234)

Methods for more efficient energy utilization at Army Ammunition Plants will be determined. These measures will be immediate or short-term applications of current technology to the various industrial processes at the plants. This effect will also determine technology requirements as it relates to explosives and propellant operations where immediate or short-term technology is not considered adequate. Efforts will be conducted to develop advanced technology in discrete segments based on potential economic payback to develop energy conservation methods.

Items Supported

This program will support all munitions items containing propellants, explosives and/or pyrotechnic materials and all related manufacturing, loading, and assembly plants.

Present Status

This program, which is in its sixth year, will produce energy inventories/balances of specific unit processes, technical reports on the various subprojects, and recommendations stating where, what, and how much energy can be conserved.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
75	191
76	875
77	997.7
78	1059.5
79	1285
81	1207 (tentative)

4225 - MMT: Red Water Pollution Abatement System (Pollution Abatement) (\$K 155)

Based assessment of current technologies, the Sonoco Sulfite Recovery Process (SSRP) was selected to eliminate pollution in streams and recover sodium sulfite from red water for reuse in the purification of TNT. Feasibility of this process has been demonstrated; however, additional MMT efforts are required to establish the optimum operating parameters of critical components such as the pelletizer, reduction kiln and scrubber, and to develop and optimize methods for clarifying and purifying the final product. These efforts will directly support an MCA project for Radford Army Ammunition Plant.

Items Supported

This project will support production of TNT.

Present Status

The end products of this project are:

1. Design data for MCA project at Radford Army Ammunition Plant, and plans for implementation at other TNT facilities containing, in addition to design data, hazard, and economic analysis.

2. A final technical report, which will produce the technical data for an optimum modular system for use at all TNT plants.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	350
81	160 (tentative)

4226 - MMT: On-Line Monitors for Water Pollutants (Pollution Abatement) (\$K 100)

This program will rank instruments for suitability in monitoring a particular pollutant in a particular waste stream, demonstrate the capabilities of the alternatives, consider the cost benefit ratios, develop design parameters for a simpler, more economical instrument dedicated to monitoring a specific pollutant, and evaluate the feasibility of using the instruments for automatic control of pollution abatement equipment.

Items Supported

This project will support all explosives and propellant items whose manufacture requires the monitoring of water pollution.

Present Status

This is the first year of a two-year program. The end products will be the selection of monitoring instruments for military pollutants in the waste waters from ammunition plants; designs for more economical instruments for monitoring a particular pollutant in a particular waste stream.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	379 (tentative)

4231 - In-Plant Reuse of Pollution Abated Waters (Pollution Abatement) (\$K 250)

The most direct way to achieve zero discharge of pollutants is not to discharge plant effluent in the first place. This concept combines abatement of waste water contamination by current state-of-the-art treatment with recycle and reuse of the abated waste water within the plant itself. The treatment plant (secondary) would be reduced as a result of the application of the water management principles or recycle, reuse and product recovery to the manufacturing processes. The abated effluent would be recycled within the plant wherever the pollutant level will not adversely affect the manufacturing process. Any remaining effluent would get tertiary treatment (carbon adsorption or ion exchange) in a unit of greatly diminished size and would be recycled within the plant.

Items Supported

This project will support all munition items containing propellants and/or explosives and related LAP operations.

Present Status

This is the first year of a two-year program. The end products technical reports and technical data in support of design criteria for the establishment of cost effective pollution abatement systems based on in-plant reuse of pollution abated waters.

Funding

Fiscal year

Funding (\$K)

81

465 (tentative)

4309 - MMT: Ammunition for 120 mm tank Main Armament (\$K 3726)

This MMT effort involves the application of new and/or more efficient manufacturing methods, techniques, and processes developed under laboratory conditions and techniques in practice now in Germany's production of 120 mm ammunition. This project will assist in adapting the the 120 mm tank main gun systems based on a German design for use as the future main armament on the SMI tank. The tasks to be accomplished are: (1) the transfer of design technology from the German to the American form for use in (2) fabrication and testing the 120 mm tank gun and ammunition system in the United States, and (3) mass production of ammunition to meet mobilization requirements.

Items Supported:

Cartridge, 120 mm, APFSDS-T: XM827
Cartridge, 120 mm, FSMP-T: XM828
Cartridge, 120 mm, APFSDS-T: XM829
Cartridge, 120 mm, HEAT-MP-T: XM830
Cartridge, 120 mm, TP-T: XM831
Cartridge, 120 mm, TPDS-T: XM 832

Present Status

The end products of this project are the technology, procedures and manufacturing knowledge to make the manufacture of the 120mm Tank Gun Ammunition to Unites States production standards in American industrial facilities.

This is the second year of a multi-year project. The tasks which are to be accomplished during FY 80 in order of priority are:

Task

Subject

1	Develop Manufacturing Methods for Stick and JA-2 Propellant
2	Explosive Loading of 120mm HEAT-MP Projectile
9	Investigation of Forming and Heat Treatment
10	Precision Forming of Tail Fin
6	Molding of Rear Seal
3	Development of Assembly Process

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	795.5
81	3988 (tentative)

4322 - MMT: Design/Criteria and System Characterization of Electronically Controlled Production Facilities (MPTS) (\$K 502)

Characterization data and design criteria must be generated to define the effects of dormant degradation on the reliability and safety of industrial electronic systems, in use or being designed, for modern ammunition facilities. The required engineering data will reflect degradation and failure mechanisms in MMT pilot facilities and full scale production systems acquired under the Ammunition Production Base Program, and through contacts with industry and other Government sources. In addition, advanced technology components and sub-systems will be procured and evaluated to fill data gaps left by the study of existing systems. Complementary data will be acquired from the ammunition facility proveout and maintenance of laid-away facilities programs. These data will be used as the basis for designing future systems and retrofitting existing systems which cannot meet production lead-time schedules. Maintenance engineering data generated by the program will be incorporated in documents for those systems now under construction or being designed, and will serve as source data for improved maintenance of fielded systems.

Items Supported

The data generated will be invaluable to a broad range of current and projected electronic and electro/optic controlled production systems. Over 85% of all ammunition facilities planned for construction during FY 80 through 84 time frame will use the technology developed in this project.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
78	185
79	609

Items Supported

Examples of items being produced or scheduled for procurement are:

- FASCAM Munitions
- COMP B
- Multi-Base Propellants
- ICM Munitions
- XM650/M549 RAP
- TNT
- Single Base Propellant
- Tank Ammo (all types)
- 20 mm, 30 mm, and 40 mm Ammo
- XM795, XM711 Conventional HE Projectiles
- Solventless Propellant
- 5.56 mm and 7.62 mm Cartridges

Present Status

This is the last year of a three-year program. The source data and technology developed on this program are directed at non-operating environments on the class of industrial hardware used in electronic and electro-optic production control systems in the plant modernization program. Primary products are: (1) A technology base which assures that the manufacturing capability is not degraded by dormancy; (2) Documentation of design requirements and procedural guidelines which ensure readiness of present and future modernization projects; (3) A test program which can be conducted at existing Army facilities on hardware tht is not in use to enhance early development of technology; and (4) A base for adjusting and/or verifying current spare parts provisioning.

4266 - MMT: Manufacturing, Inspection and Test Equipment for
Magnetic Power Supply (Fuze) (\$K 345)

The improvement of the M456A1 HEAT cartridge includes changing the location of the power supply from the projectile nose to the PIBD fuze housing and changing it to a magnetic pulse, generating-type power supply which is unaffected by shock vibrations. The manufacturing, inspection, and test methods, and the technology required to produce the magnetic power supply will be developed during a two-year MMT program. This type of power supply, which is used in other munitions such as guided missiles (larger and withstanding relatively lower gravitational forces), has never been produced in the size and quantity required for artillery, tank, and mortar ammunition. The methods and technology developed will

accommodate full or partial automation as quantity and costs dictate. The MMT program will also be applicable to future generation HEAT ammunition such as 105 mm cartridge HEAT-MP-T XM815.

Items Supported

PIBD Fuze for HEAT Ammunition

Present Status

This is the first year of a two-year program. The GOCO hardware and equipment acquired under this project will provide for automated or semi-automated production of magnetic power supplies at a cycle rate of 10 seconds. Additional end products will be manufacturing, inspection and testing data, and a final report. This power supply can be used for other products, and incorporated in future designs. Its adaptable size and modular construction make it an "off-the-shelf" item for a multitude of applications. Ease in manufacturing, resulting from this effort, will increase its potential for future use.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	759 (tentative)

4084 - MMT: Opacity/Mass Emission Correlation (Pollution Abatement) (\$K 111)

Given the proper development, there is a reasonable expectation that an available and inexpensive opacity monitor can be used to measure and record mass as well as opacity. What is needed is the correlation between opacity reading and the mass emission rate. With this correlation and an opacity monitor, AAP's will be well suited to meet the new EPA regulations.

Items Supported

Large Caliber Production.

Present Status

This is the last year of a two-year program. The end products of this project will be correlation charts developed on site at the AAP's which will convert opacity readings to mass emission rates. A report will be prepared and published. The major effort of this

project will, therefore, be evaluation and correlation of available equipment to monitor opacity and mass emissions.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
75	465
76	400
77	200
78	196
79	483

4189 - MMT: High Fragmentation Steel Production Process (MPTS) (\$K 1048)

New and improved production processes and techniques will be examined and refined relative to the manufacture of high fragmentation steel projectile parts. General areas of study will include reduction of starting multi-weight via forge tooling designs, optimizing of machining techniques, determining necessity to spheroidize anneal forgings, refining of hot nosing process with follow-up stress relief of nosed bodies, examining various heat treatments, and determining of new fracture toughness test. All projectile metal parts will be processed to their finished state in order to evaluate all fabrication processes and inspectability with investigation of problems encountered and improvements made where possible. The 155mm XM795 will be the test vehicle for this work.

Items Supported

All large caliber ammunition from 120 mm to 8 in., with components manufactured from high fragmentation steel.

Present Status

This is the second year of a four-year program. The end products of this project are: (1) Improved, economical processes for manufacturing high-fragmentation steel parts which have generic application to 120 mm through 8-in. projectiles; (2) comprehensive data bank on processing high-fragmentation steel; (3) reliable, economical fracture-toughness test for incorporation into TDP's of high fragmentation-steel parts.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	533
81	1153 (tentative)

4498 - MMT: Develop Method for Consolidatio and Automated Assembly of Small Mines (LAPS) (\$K 392)

A study will be made of the LAP procedures for each of the three mine systems (RAAM, GEMSS, GATOR) to determine the extent of automation for each operation. A technical review will be conducted after the study phase before the detail design. Prototype equipment will be developed, built, installed, and proved out at Iowa AAP.

Items Supported

RAAM M70 AT Mine Program
GEMSS Scatterable Mine System XM74 (AP) and XM75 (AT) Mines
GATOR CBU78; CBU84

Present Status

This is the last year of a three-year project. This project will provide technical data packages, LAP process procedures, automated inspections, and prototype equipment for LAP operations.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
78	325
79	572

6736 - MMT: Technical Readiness Accelerated through Computer Integrated Manufacturing (TRACIM) CAD/CIM (MPTS) (\$K 315)

The development and implementation of a Computer Integrated Manufacturing (CIM) system involving interactive graphics and numerical control machine tools will significantly reduce the requirement for highly skilled manufacturing craftsmen. Also, a computer data bank, based on Group Technology techniques and maintained in a ready status, will provide management and engineers

immediate access to the very latest data required for a rapid build-up to maximum planned schedules.

Items Supported

155 mm family of artillery ammunition, 8-in. family of artillery ammunition, 105 mm tank round. This technology may be extended later to small arms and other artillery systems.

Present Status

This is the last year of a four-year program. A comprehensive CIM system will be developed and demonstrated on samples of ongoing metal parts and items in the planning stage. The system will be suitable for application to the entire spectrum of ammunition design and manufacture.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
76	400
78	100
79	256

6738 - MMT: Ultra High-Speed Metal Removal, Artillery Shell (MPTS)
(\$K 297)

Removal of metal at high rates of speed requires large quantities of equipment to accomplish a particular machining operation. The solution to this problem is to investigate another technique for high speed metal removal. Achieving increased metal removal, which will be investigated under this project, has been limited to plasma-arc-assisted machining which increases productivity significantly.

Items Supported

This project will support all artillery and mortar projectile metal parts.

Present Status

This is the last year of a two-year program. The end product will be the development of a manufacturing method and technology that can be used for machining steel at metal removal rates significantly higher than current rates and at reduced production costs.

Funding

Fiscal year

79

Funding (\$K)

181

MMT WEAPONS PROGRAM

The main emphasis of the MMT weapons program is the modernization and upgrading of operations. The purpose is to reduce costs and improve product quality by taking advantage of advances in metal working technology.

Since most items produced at Watervliet Arsenal are complex and/or require close tolerances, the setup and movement time are important cost factors. While it is not economical or practical to develop an integrated material handling system for Watervliet, extensive savings can be realized through improvement of present methods.

Another major cost factor is the machining of items to final shape. Since the alloys used in weapons are expensive and difficult to work with, producing components close to final shape will reduce the cost and time required for finishing. Projects are also proposed to improve the metal removal process.

Improved metal working methods and increased use of computer-aided manufacturing are major production trends. The results of the projects in this area are expected to hold significant interest for other producers, in both government and private industry. These projects will also be important in modernizing and upgrading contractor facilities, many of which are seriously outdated.

MMT WEAPONS PROJECTS

ARRADCOM's FY 80 MMT weapons projects are itemized in table 2 and discussed below.

Table 2. FY 80 MMT weapons projects

<u>Responsible LCWSL division</u>	<u>No.</u>	<u>Project</u>	<u>Cost (\$K)</u>
Benet Weapons Laboratory	7730	Manufacture of Split Ring Breech Seals, MPTS	453
	7920	Conservation of Critical Materials for Gun Tubes, MPTS	236
	7925	MMT: Bore Evacuator Boring, MPTS	111
	7926	MMT: Hot Isostatic Pressing (HIP) of Large Ordnance Com- ponents, MPTS	216
	7927	MMT: Generation of Base Machining Surfaces, MPTS	86
	7928	MMT: Robotized Benching Operations (CAM), MPTS	113
	8024	MMT: High Speed Abrasive Belt Grinding, MPTS	324
	8026	MMT: Application of Synthetic Quenchants to Gun Tubes and Heavy Weapon Components, MPTS	143
	8047	MMT: Pass Through Steady Rests for Tube Turning, MPTS	269
	8105	MMT: Establish Rough Thread Blanks, 8 in. M201 Bushing, MPTS	88
	8106	MMT: Large Caliber Powder Chamber Boring, MPTS	59
	8107	MMT: Creep Feed Crush Form Grinding, MPTS	348
	8208	MMT: Material Handling, MPTS	113
	8341	MMT: Hollow Cylinder Cut Off Machine, MPTS	69
	8342	MMT: Keyway Milling Machine, MPTS	242
	8057	MMT: Dual Rifling Broach Removal System, MPTS	215
	8059	MMT: Salvage of Cannon Components by Electrodeposi- tion, MPTS	152
	8060	MMT: Improved Manufacturing Processes Related to Final Inspection of Cannon Tubes, MPTS	268

7730 - MMT: Manufacture of Split Ring Breech Seals (MPTS) (\$K 453)

Automated and improved procedures will be adopted which will minimize hand finishing operations negate the need of highly skilled operators, and reduce cost. This project will perfect up-to-date automated machinery, tooling, and modern techniques to manufacture split rings to design specifications with little or no rejection. Split rings cannot be made in PEP lines at this time since the present procedures require highly skilled personnel. The proposed solution would resolve this problem.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm Howitzer: M185	Howitzer, Medium S.P., 155 mm: M109A1
Cannon, 175 mm GUN: M113E1	Gun, Field Artillery S.P., 175 mm: MWT
Cannon, 155mm Howitzer: M199	Howitzer, Medium Towed, 155 mm:
Cannon, 155mm Howitzer: M1A1	Howitzer, Medium Towed, 155 mm: M114, M114A1
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P., 8 in.: M110A1

Present Status

The end products will consist of new automated manufacturing equipment, tooling, and techniques to manufacture split rings at a reduced cost. In addition, designs of machinery, operating conditions, i.e., speeds, feeds, tooling and all the necessary information to implement the newly developed techniques will be compiled into a complete package.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	148

7920-MMT: Conservation of Critical Materials for Gun Tubes (MPTS) (\$K 236)

The implementation of this project will reduce reliance on foreign sources for critical materials. This is especially important since it is predicted that the use of chromium for stainless

steel will increase in the future, while supplies decrease. Decreasing reliance on the critical alloys will ensure a steady supply of material for tubes, and decrease their cost. This project will generate the necessary processing modifications to allow the use of alloy steels with lower critical alloys.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 81 mm Mortar: M29A1	Mortar, Infantry, 81 mm: M29A1, W/E
Cannon, 90 mm Gun: M41	Tank, Combat F.T., 90 mm: M48, M48A3
Cannon, 105 mm Howitzer: M2A1-M2A2	Howitzer, Lt. Towed, 105 mm: M101, M101A1
Cannon, 105 mm Howitzer: M137-M137A1	Howitzer, Lt. Towed, 105 mm: M102
Cannon, 105 mm, Gun: M68	Tank, Combat F.T., 105 mm: M60, M60A1
Cannon, 105 mm, Howitzer: XM205	Howitzer, Lt. Towed, 105 mm: XM204
Cannon, 4.2 in. Mortar: M30	Mortar, 5.2 in.: M30, W/E (Cannon, M30/Mount M24 or M24A1 ARAAV
Cannon, 152 mm, Gun Launcher: M81E1	
Cannon, 155 mm, Howitzer: M185	Howitzer, Med, S.P., 155 mm: M109A1
Cannon, 155 mm, Howitzer: M1-M1A1	Howitzer, Med Towed, 155 mm: M114, M114A1
Cannon, 155 mm, Howitzer: M199	Howitzer, Med Towed, 155 mm: M198
Cannon, 152 mm, Gun, Launcher: M162	Tank, Combat F.T., 152 mm Gun: M60A2
Cannon, 175 mm, Gun: M113-M113A1	Gun, Field Artillery S.P, 175 mm: M107
Cannon, 8 in. Howitzer: M2A2/M201	Howitzer, Heavy S.P., 8 in.: M10/M110A1
Rifle, Recoil, 90 mm: M67	Rifle, 90 mm: M67, W/E
Rifle, Recoil, 106 mm: M40A2, M40A4	Cannon, 106 mm, Rifle, Recoil: M206
Rifle, Recoil, 106 mm, M40A3, M40A5	Cannon, 106 mm, Rifle, Recoil, M206A1

Present Status

Processing parameters will be established which allow the use of alloy steels with less critical alloying material.

7925 - MMT: Bore Evacuator Boring (MPTS) (\$K 111)

A special purpose machine and tooling package providing a head for each end of the evacuator chamber will be developed to produce both bores simultaneously. If both surfaces were produced from the same setup, orientation of the centerlines would be automatically assured. A form mill similar to a hob is envisioned as the tooling so that, when the bore diameter is complete, all other features of the bore will meet their dimensional requirements.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Gun: M68	Tank, Combat F.T., 105 mm Gun: M60 and M60A1
Cannon, 155mm, Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1

Present Status

The end product of this project will be the design, testing, and procurement of a special purpose machine for the 105mm, M68 bore evacuator and a machine capable of accepting tooling for all in-line bore chambers.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	248 (tentative)

7926 - MMT: Hot Isostatic Pressing (HIP) of Large Ordnance Components (MPTS) (\$K 216)

By using HIP, it is possible to fabricate breech blocks closer to the final shape than the currently used forging. This method has been in use since the 1950's, but for many years the equipment required discouraged production use of the process. Improvements in pressure vessel and furnace design have now brought the HIP process to a very practical production process.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 8 in. Howitzer: M201	Howitzer, Hy S.P., 8 in.: M110A1
Cannon, 175mm, Gun: M113	Gun, F.A., S.P., 175mm: M107
Cannon, 8 in. Howitzer: M2A2	Howitzer, Hy, S.P., 8 in.: M110

Present Status

The end products of this effort will be a complete production technique capable of producing a step thread type breech block using the HIP process and a technical report.

7927 - MMT: Generation of Base Machining Surfaces (MPTS) (\$K 86)

A procedure will be developed to combine a setup technique with an efficient machining process for rough forgings and castings. The new process will replace the present method of setting up and laying out the work in one area, then performing an equivalent setup on a machine and the conventional machining of working surfaces to layout lines in another area. Preset optical comparator layouts and/or preset height gaging will be employed to set up the first cuts directly on the machine on a one time basis. On evaluation of these processes, the advantages will be adopted and the necessary fixtures and tools purchased and applied to the 105mm M68 breech ring production line.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 175mm, Gun: M113A1	Gun, Field Artillery, S.P., 175 mm, M107
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P.: M110E2
Cannon 155mm Howitzer: M185	Howitzer, Med, S.P., 155 mm: M109A1
Cannon, 105mm, Gun: M68	Tank, Combat, F.T., 105 mm, Gun: M60 and M60A1

Present Status

The primary end product will be equipment capable of generating first cut surfaces. In addition, a formal technical report

showing complete economic and technical results will be written and circulated to responsible manufacturing operating personnel.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	137 (tentative)

7928 - MMT: Robotized Benching Operations (CAM) (MPTS) (\$K 113)

In benching operations, breech rings and breech blocks in particular, an industrial robot will be used in manufacturing operations that are too hazardous, boring, or uneconomical for humans. With a robot in control, the hazardous aspect of benching operations will be eliminated and metal grinding time will be reduced to 50% or less. The effort will draw upon experience gained within the Government as well as in private industry. The first year's effort of pre-engineering associated with various manufacturing applications will determine the areas of potential robot use and the type(s) of equipment necessary. Specifications will be drawn up accordingly. Detailed in-house and out-of-house studies will be performed to aid in application and equipment selection. Subsequently, material acquisition and installation will be implemented. Material acquisition and installation will follow the first year's pre-engineering associated with various manufacturing applications and equipment selection.

Items Supported: The following items are examples of the types of items supported:

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Howitzer: M2A1-M2A2	Howitzer, Lt Towed, 105 mm: M101, M101A1
Cannon, 105 mm Howitzer: M137 M137A1	Howitzer, Lt Towed, 105 mm: M102
Canon, 105 mm Gun: M68	Tank, Combat F.T., 105 mm: M60, M60A1
Cannon, 90 mm Gun: M41	Tank, Combat F.T., 90 mm: M48, M48A3
Cannon, 105 mm Howitzer: M205	Howitzer, Lt Towed, 105 mm: M204
Cannon, 152 mm Gun Launcher: M81E1	ARAAV: M551
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm Howitzer: M1, M1A1	Howitzer, Med Towed, 155 mm: M114, M114A1
Cannon, 155 mm Howitzer: M199	Howitzer Med Towed, 155 mm M198

Present Status

The end product will be an industrial robot capable of performing hazardous benching operations in a minimum amount of time. A second robot will be considered to perform the mundane, error prone task of bore inspection. In both cases, "movements" will be programmed and stored for immediate retrieval, implementing the use of the robots on the production lines. Trained operators will oversee the various operations. A final technical report will be written.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	287 (tentative)

8024 - MMT: High Speed Abrasive Belt Grinding (MPTS) (\$K 324)

This two-year funding effort will be used to introduce a new machining technology to the Arsenal. Abrasive belt sanding has, over many years, been used to polish cylindrical pieces in lathe setups or in hand applied machines; belts were used to polish various shapes and forms. Recent advancements in belt grits and bonds have improved belts, and machines have been designed so that abrasive belt use has developed from polishing into an abrasive metal removal process. FY 80 funding will be used to procure the equipment required to apply this technology to canon components.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm, Gun: M68	Tank, Combat, F.T., 105 mm Gun: M60 and M60A1
Cannon, 155 mm, Howitzer: M185	Howitzer, Med S.P., 155 mm M109A1
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P., 8 in.: M110A1

Present Status

The end product of this program will be a new machine with a capacity to drive a wide abrasive belt for metal removal on gun tube hoop zones. A final report will be written.

8026 - MMT: Application of Synthetic Quenchants to Gun Tubes and Heavy Weapon Components (MPTS) (\$K 143)

Quenching mediums for large alloy steel components consist primarily of water and oil. Often these quenchants are not satisfactory from either the thermal phenomena or the safety standpoint. As a result, problems such as incomplete transformation, cracking, distortion, residual stress, occasional fires, and noxious fumes frequently occur. Current manufacturing technology has not significantly alleviated this problem.

Recently, polymeric materials have become available that are water soluble and favorably influence the heat transfer properties of the quenching medium. These additions alter the quench power of the bath and allow the heat treater to obtain a range of cooling rates while eliminating the hazards associated with oil quenching.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Gun: M68	Tank, F.T., 105 mm Gun: M60
Cannon, 155 mm Gun: M1A1	Howitzer, Med Towed, 155 mm: M114A1
Mortar, 4.2 in.: M30	Mortar, 4.2 in.: M30

Present Status: The end product of this project will be a comprehensive technique to quench components, generally requiring oil, in water based synthetic quenchants. Prototype parts will be available for testing and service.

8047 - MMT: Pass Through Steady Rests for Tube Turning (MPTS) (\$K 269)

Machining of cannon tubes exerts a transverse force greater than the full length tube can withstand. Dimensional and surface finish requirements are impossible to obtain when the tube is unsupported at its longitudinal center. A roller steady rest currently provides the required support, but it also becomes an

obstacle to turning the full length of the tube in one setup. Currently, in order to turn gun tubes, either the lathe must have two carriages or two separate lathes must be provided and the tube moved from machine to machine. There is no supplier of this type of equipment.

A pass through rest is needed which will allow the carriage to move from one supported area of the tube to the other without disturbing the setup. The design will be applicable to currently available equipment, but will have even greater impact on new equipment acquisitions.

In FY 80, a complete investigation of tube turning problems will be reviewed to determine anticipated loads and pressures that will be encountered in tube support. Depending on the outcome of this investigation, an in-house design or a specification for a rest attachment will be prepared.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm, Howitzer: M199	Howitzer, Med Towed, 105 mm: M198
Cannon, 105 mm, Gun: M68	Tank, Combat F.T., 105 mm Gun: M60 and M60A1
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1
Cannon, 175mm Gun: M113	Gun, Field Artillery, S.P., 175 mm: M107
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P., 8 in.: M110A1

Present Status

The end product of this project will be the design and fabrication of a universal design of a pass-through rest. This unit will be adaptable to a wide variety of in-place equipment and will be specified so that it can be included in new equipment acquisitions. The equipment obtained as a result of this project will be installed on a production machine.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
78	80

8105 - MMT: Establish Rough Thread Blanks, 8 in. M201 Bushing (MPTS) (\$K 88)

Single point slotting tools are currently being used to produce the configuration of the 8 in. M201 bushing step thread blanks. The steps are produced on an inside diameter and are somewhat inaccessible. The cubic volume of metal to be removed is high and the configuration is intricate so we require a new process that will remove the material at an accelerated rate. The mating component also has the same configuration but, because the threads are on the outside diameter, they are more accessible. Again, the metal volume to be removed is high. A machining process is needed to reduce machining time for both of these components.

There are a number of possible solutions to this problem. Some are applicable to both components, while others are limited to one or the other component. On first glance, multiple slotting tools, an extension of the present method, would increase productivity. Alternate solutions include EDM traveling wire, ECM blanking, and a combination of milling and multiple slotting.

Items supported:

<u>Item</u>	<u>Weapons system</u>
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P., 8 in.: M110A1
Cannon, 175 mm Gun: M113	Gun, Field Artillery, S.P., 175 mm: M107

Present Status

The end products of this project will be a special purpose machine dedicated to preparation of step thread blanks, a selection of the most advantageous approaches to the problem and execution of that selection in the form of equipment acquisition.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	307 (tentative)

8106 - MMT: Large Caliber Powder Chamber Boring (MPTS) (\$K 59)

Powder chamber contours are currently bored with a single point tool attached to one end of a bar, while the other end is

supported by the machine carriage. Chamber depths are often 3 feet. Tool pressure deflects the bar, reducing the accuracy of the boring operation and making it necessary to semifinish grinding the contour.

Application of a balance tool system will eliminate the deflection problem, thereby improving the accuracy of the bored hole, making the rough grinding operation unnecessary. An added benefit is that two tools will penetrate the workpiece faster and reduce boring operation time.

The thrust of this project will be the development of an hydraulically powered cutting tool system. The system will be unique in that, in current contour boring systems, the contour is developed by cross movement of the machine carriage while, in the system to be developed, the bar must be centered and the tools moved equally, but independently, from the bar to produce the contour. Since this is a major deviation from known systems, a reasonable amount of development work will be required.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm Howitzer: M185	Howitzer, Med, S.P., 155 mm: M109A1
Cannon, 155 mm Howitzer: M199	Howitzer, Med, Towed, 155 mm: M198
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy, S.P., 8 in.: M110A1

Present Status

This is the first year of a three-year program. The end product of the FY 80 effort will be a systems design of a hydraulically controlled boring technique adaptable to current powder chamber boring equipment.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	159 (tentative)
8107 - MMT: Creep Feed Crush Form Grinding (MPTS) (\$K 348)	

Despite recent adaption of NC machining centers, the cost of producing certain intricate straight forms on components remains a

bottleneck operation. The availability of these machining centers is limited and most are working at near maximum capacity. Conventional grinding operations have a different limitation in their metal removal capacity when applied to intricate configuration development.

An FY 79 program successfully demonstrated the adaptability of creep feed grinding and a machine specification will be prepared. Equipment acquisition is now necessary. Two areas of application have been verified as candidates for creep feed crush form grinding: the bracket slot on the 105 mm M68 breechblock and the rack teeth on the 152 mm M162 coupling. In FY 79, a specification for a creep grinder was also prepared. To aid in the prove-out, the tooling package will also be specified.

The work to be performed with FY 80 funding will be to buy the equipment specified. The funding will also support installation and initial testing of the equipment.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Gun: M68	Tank, Combat, F.T., 105 mm Gun M60
Cannon, 152 mm Gun: M162	Tank, Combat, F.T., 152 mm Gun M60A2

Present Status

The end product of the FY 80 project will be a creep feed crush form grinding machine tooled for the production of at least one component.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
79	82
81	73 (tentative)

8208 - MMT: Material Handling (MPTS) (\$K 113)

The movement of large gun tubes 12 in. in diameter, 20 feet long, weighing 2 to 4 tons, through the shops as well as positioning the pieces in machines for metal removal presents a materials handling problem. Presently, gun tubes are handled primarily

through large rail-mounted overhead cranes. The cranes provide longitudinal in-bay movement, but not cross-bay movement, and require costly and time consuming manpower to rope and position pieces in the machines and on the floor.

Positioning equipment (such as Heppenstall tongs), will be evaluated and side-mounted fork lights, monorail cross-bay transfers with floor controls, and other material moving equipment will be checked for application to the unique problems and material mix (breech rings, breech blocks, and small as well as large components) peculiar to large tubes.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm, Howitzer: M2A1-M2A2	Howitzer, Lt Towed, 105 mm: M101, M101A1
Cannon, 105 mm Howitzer: M137, M137A1	Howitzer, Lt Towed, 105 mm: M101
Cannon, 105 mm Gun: M68	Tank, Combat, F.T., 105 mm: M60
Cannon, 90 mm Gun: M41	Tank, Combat, F.T., 90 mm: M58, M48A3
Cannon, 105 mm Howitzer: XM205	Howitzer, Lt Towed, 105 mm: XM205
Cannon, 152 mm Gun Launcher: M81E1	ARAAV: M551
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1
Cannon, 155 mm Howitzer: M1, M1A1	Howitzer, Med Towed, 15 mm: M109A1
Cannon, 155 mm Howitzer: M199	Howitzer, Med Towed, 155 mm: M198
Cannon, 81 Mortar: M29A1	Mortar, Infantry, 81 mm: M29A1 W/E (Cannon: M29A1/ Mount: M23A1/Baseplate: M3
Cannon, 4.2 in. Mortar: M30	Mortar, 4.2 in.: M30, W/E (Cannon: M30/Mount: M24 or M24A1)
Rifle, Recoil, 90 mm: M67	Rifle, 90 mm: M67, W/E
Rifle, Recoil, 106mm: M40A2, M40A4	Cannon, 106 mm Rifle, Recoil: M206
Rifle, Recoil, 106mm: M40A3, M40A5	Cannon, 106 mm Rifle, Recoil: M206A1

Present Status

Recommendations will be made for the purchase of specific types of equipment for specific manufacturing areas and a technical report will be written.

8341 - MMT: Hollow Cylinder Cutoff Machine (MPTS) (\$K 69)

Establishing the length of an item is accomplished in one of two ways: It is either parted off in a lathe and faced to length or it is rough sawed and set up in a lathe for facing to finish length dimension. In either case, the operation requires double measuring, double handling, and slow operating procedures. A new approach is required that will establish exact length, produce an acceptable finish, and eliminate redundant operations.

A new technology is being developed whereby a set of rotating cutters mills the cylinder to exact length, leaving a surface finish within that specified for cannon requirements. Currently available machines will not accommodate the forgings, but the technology is applicable.

The objective of this program is to develop a machine that will adjust tube position to establish overall component length and apply modern cutoff techniques to improve production efficiency.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Howitzer: M2A2	Howitzer, Light Towed, 105 mm: M101 and M101A1
Cannon, 105 mm Gun: M68	Tank, Combat, F.T., 105 mm Gun: M60A1
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1
Cannon, 155 mm Howitzer: M199	Howitzer, Med Towed, 155 mm: M198

Present Status

The end product of this project will be a tube cut-off machine that will combine a length control capability with an efficient cutoff technique to replace sawing procedures.

Funding

<u>Fiscal year</u>	<u>Funding (\$K)</u>
81	164 (tentative)

8342 - MMT: Keyway Milling Machine (MPTS) (\$K 242)

The 155 mm M185 gun tube requires 3 keyways be milled on centerline to close location and tolerances. Currently, these keyways are milled in three different machines requiring three material moves, three machine sites and three setups. Material handling, floor space, and operational time are all critical commodities in production areas.

A special purpose keyway milling machine will be developed to hold the tube on location while all three keyways are milled simultaneously. This would assure accuracy of all keyways to the proper centerline location and eliminate moving the tube from machine to machine, reduce operational time, and save floor space. Floor space savings would accrue from the reduction of required machines and from a reduction in tube storage while tubes are awaiting various operations.

This is a one-year funded effort. A single purpose milling machine, composed mainly of building block modules, will be designed and constructed. The machine will be equipped to automatically locate the cylindrical gun tube to the correct centerline position and to the non-symmetrical features of thread location. Approximately 50% of the funding will be used for material acquisition, and the remaining 50% will be used to support in-house fabrication and assembly.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm

Present Status

The end product of this project will be a special purpose milling machine. The design will consider automatic self-alignment of keyway positions so that, while the machine will be designed basically for the 155 mm tube: M185, it will also have the capability of producing keyways on centerline location on any size tube within the confines of the base design.

8057 - MMT: Dual Rifling Broach Removal System (MPTS) (\$K 215)

Removing the broaches automatically and concurrently after complete penetration through the bore will reduce operational time, the operator's contact time with the cutter, and fatigue, thereby reducing the safety hazard.

A rifling machine that produces two gun tubes simultaneously will be equipped with an automatic broach removal device. While broach removal systems are not entirely new, the systems currently available infringe on the space used by the second tube in the dual rifling system. The work effort then is to design and construct a removal system that will be compatible with the dual rifler. FY 80 funding will be used to design the equipment necessary to interface with existing production equipment and to build, install, and test the equipment.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Gun: M68	Tank, Combat F.T., 105 mm M60 and M60A1

Present Status

The end product will be a production-worthy dual broach removal system that will also serve as a model for REARM specifications which identify dual rifling as a future machine requirement. A final report describing the operation and maintenance of the system will be prepared.

8059 - MMT: Salvage of Cannon Components by Electrodeposition (MPTS) (\$K 152)

Some components and full gun tubes have been rejected and condemned due to excess stock removal or mismachining. Many of these items could be restored to an acceptable condition if a metal deposition system could be designed to salvage these components.

A process which deposits additional metal to specific areas to compensate for excess stock removal would resolve the problem. The system would use plating solutions such as nickel or iron or, possibly, chromium. The deposition would be accomplished by immersing of the component in the plating solution by use of a selective or brush plating system or, for internal areas, a pump through system.

The proposed investigation will involve evaluating the component, the area of excess stock removal, and the function of the component. The selection of the method of metal deposition will follow with importance placed on the adaptability by operations personnel.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 105 mm Gun: M68	Tank, Combat, F.T., 105 mm Gun: M48A4, M48A5, and M48A6
Cannon, 105 mm Howitzer: M137/M137A1	Howitzer, Lt Towed, 105 mm: M102
Cannon, 105 mm Howitzer: M2A2	
Cannon, 152 mm Gun Launcher: M162	Tank, Combat, F.T., 152 mm Gun: M60A2
Cannon, 155 mm Howitzer: M1A1	Howitzer, Med Towed, 155 mm: M114A1
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1, M109A1B
Cannon, 155 mm Howitzer: M199	Howitzer, Med Towed, 155 mm: M198
Cannon, 175 mm Gun: M113	Gun, F.A. S.P., 175 mm: M107
Cannon, 8 in. Howitzer: M2A2	Howitzer, Heavy S.P., 8 in.: M110
Cannon, 8 in. Howitzer: M201	Howitzer, Heavy S.P., 8 in.: M110A1

Present Status

End products from project:

1. Test Data and Systems Design
2. Prototype Processing Equipment
3. Plans for Implementing the Equipment into the Production Line
4. Operating Instructions
5. Final Report

The end product will be a metal deposition system capable of restoring components to an acceptable condition.

8060 - MMT: Improved Manufacturing Processes Related to Final
Inspection of Cannon Tubes (MPTS) (\$K 268)

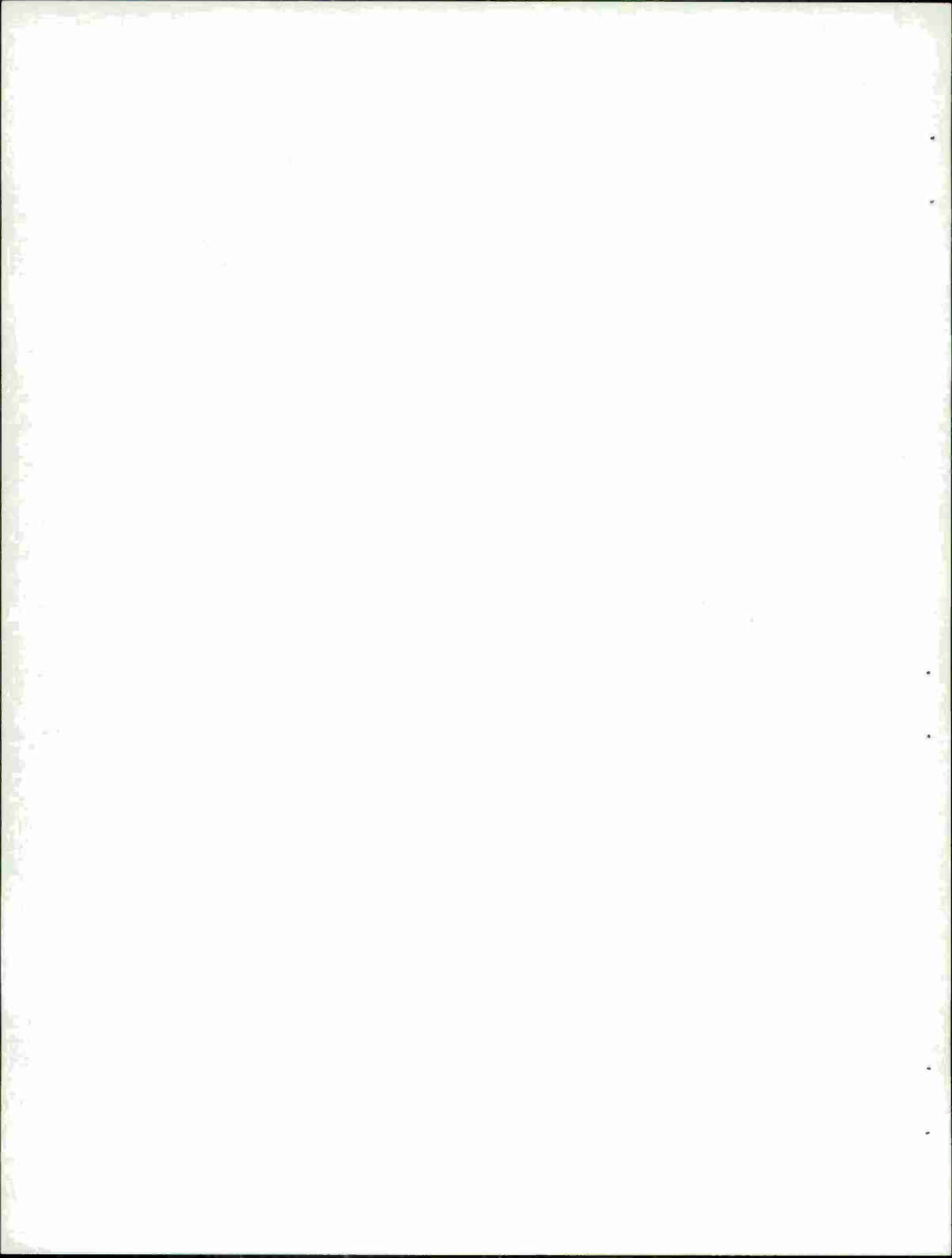
An in-depth analysis will be undertaken to incorporate the latest materials handling technology to fully mechanize the final inspection line. In addition, new technology will be employed to improve the cleaning and magnetizing processes. Procurement action will be undertaken to acquire the equipment. This equipment will be installed, fixtured and tested. Production data will be gathered and evaluated. Improvements in the inspection process will be made.

Items Supported

<u>Item</u>	<u>Weapons system</u>
Cannon, 155 mm Howitzer: M185	Howitzer, Med S.P., 155 mm: M109A1
Cannon, 105 mm Gun: M68	Tank, Combat F.T.: M60A1
Cannon, 120 mm Gun	Tank, Combat: XM1

Present Status

The end product will consist of new mechanized manufacturing equipment for magnetizing gun tubes, a new cleaning unit and a fully engineered system for loading and unloading gun tubes through the various inspection operations.



APPENDIX A

FORMAT FOR SEMI-ANNUAL REPORT

FORMAT FOR
SEMI-ANNUAL REPORTING

MANUFACTURING TECHNOLOGY (MANTECH) PROGRAM
PROJECT STATUS REPORT (RCS DRCMT-301)

USA ARMAMENT RESEARCH & DEVELOPMENT COMMAND
DOVER, NJ 07801

(If final report, so state here)

Report Date:

1. Project Number. Insert the DARCOM seven digit project number. Also include in parentheses the four digit budget code from AR 37-100. (For multi year funded projects, list budget codes as shown in the example.)
2. Project Title. Enter the title of the project exactly as stated on the approved P-16 format.
3. Period Covered. Insert the dates of the period covered by the report. (See body of report for dates.)
4. Location of Work. List the name and address of the Government installation and contractor facility where the work is being accomplished.
5. Project Officer. Insert the name and telephone number (AUTOVON) of the individual responsible for technical supervision of the project.
6. Funding Status. a. Insert the total funds authorized and the date funds were made available to the action command.
b. Insert a cost breakout in the format below.

(1) In-House Effort

FYXX	FYXX
<u>Obligation</u>	<u>Expenditure</u>

Labor

Materials

(2) Other Government Agencies (OGA)

Date of

(3) <u>Contractor</u>	<u>Contract No.</u>	<u>Award</u>	<u>Contract Value</u>	<u>Expenditure</u>
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(4) GOCO

(List by contractor for each contract let. Include contract number. If a contract is still to be let, enter "Contract to be let," estimate the contract value, and leave the remaining two columns blank.)

7. Milestone Chart. Include the Exhibit P-16 milestone chart that delineates the time phases and the major events of the project. This chart will be updated as necessary with each status report. Current position on the milestone chart will be noted. Slippage will be measured in terms of the original chart. Enter the fiscal year of funding for each milestone.

8. Item(s) Supported. (Use only applicable subparagraphs)

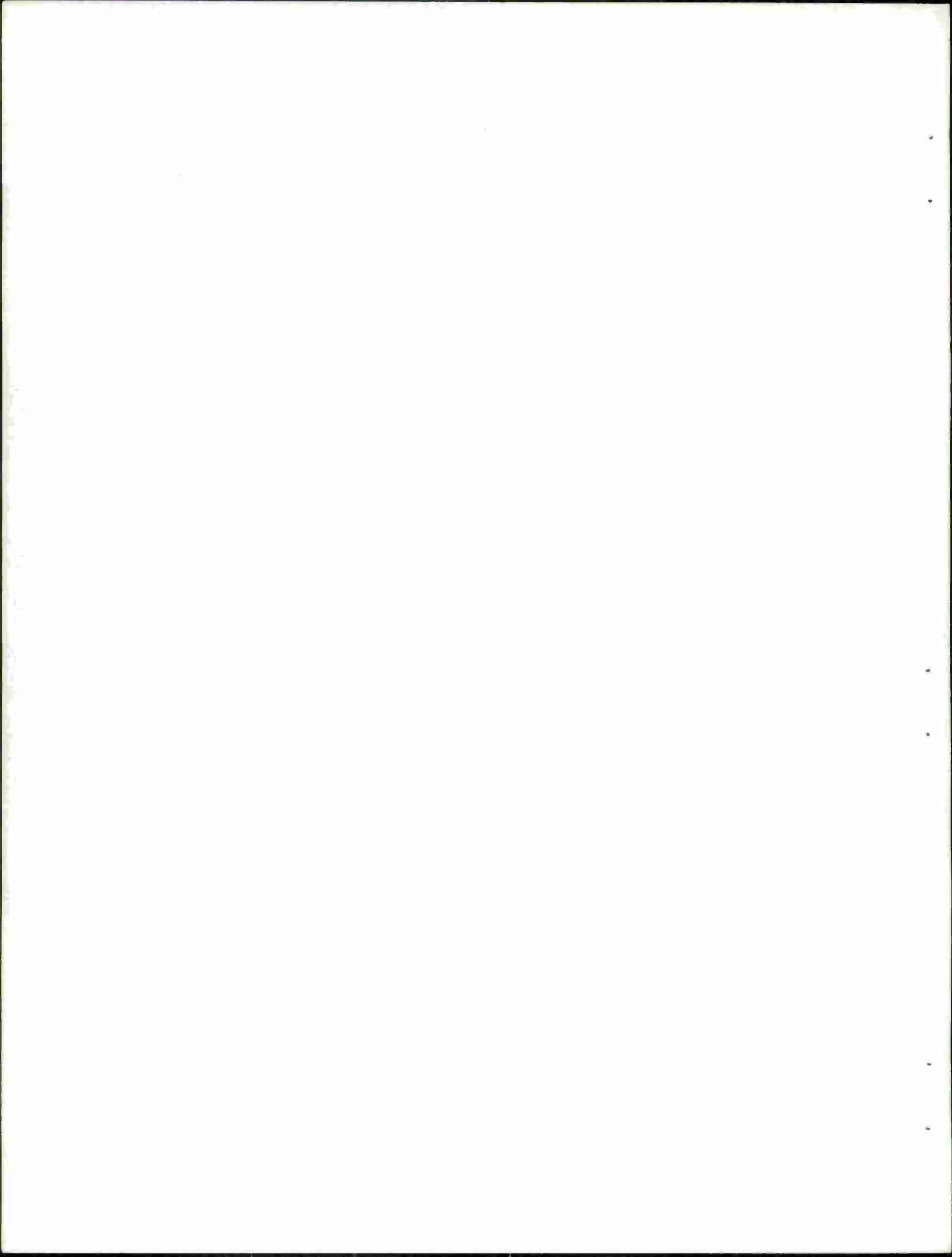
- a. Major End Items: List all families of items that will benefit from successful completion of the project.
- b. Components Supported: List individual components of the mission item that this effort directly supports.
- c. Facilities Supported: For MMT in support of modernization of facilities give the name of the facility and the technical area(s) supported. Identify facilities as GOGO, GOCO, COCO.
- d. Technical Area(s) Supported: For MMT projects, list the particular manufacturing processes, techniques, or methods that this project is addressing.

e. Requirement Supported: Identify for MACI projects only, the requirement being addressed using the CARDS reference number and a brief summary sentence of the approved requirement.

9. Task. Identify the task. State why a solution is necessary.
10. Project Objective. Identify the major and minor objectives of the effort (not end products).
11. Work Accomplished. Insert a brief technical discussion of the work accomplished during the reporting period or, if this is a final report, a summary of the technical work accomplished. Highlight the technical achievements of this effort; include principal features, capabilities, and specifications. Include photographs and illustrations suitable for reproduction. Group by fiscal year of funding.
12. Benefits. This item needs to be completed only in the final status report. ie; in the event of a multi year funded project, fill this item in only for the last fiscal year to be completed.
 - a. Discuss the benefits derived from this project and explain their value to the Army.
 - b. Identify all areas for application of project results.
 - c. Include proven cost reductions.
 - d. Indicate whether or not patent rights are involved.
13. Implementation Procedures. This item needs to be completed only in the final status report. Provide a detailed description of the action that will be, or has been, taken by the organization to implement the results of this project. ie - same as above

14. Remarks. This space is for entering all other information deemed pertinent by the project engineer. Describe any problems encountered in this section. Include any milestone slippages with reasons for slippage and length of slippage.

ARRADCOM Project Officer



APPENDIX B

FORMAT CHARTS FOR SEMI-ANNUAL BRIEFING

CHART 1 — KEY PROJECT INFORMATION

DATE:

CODE:

CATEGORY: FUNCTIONAL—

MMT PROJECT:

TECHNOLOGY—

PROJECT TITLE:

INITIATION DATE:

COMPLETION DATE:

PROJECT OFFICER:

PROJECT ENGINEER:

DESCRIPTION:

BENEFITS:

IMPLEMENTATION:

FACILITY PROJECTS SUPPORTED:

MAJOR ITEMS SUPPORTED:

DATE:

PROJECT TITLE:

% PHYSICAL COMPLETION

$$\frac{\% \text{ FORECAST}}{\% \text{ ACTUAL}}$$


ORIGINAL MILESTONE



MILESTONE ACCOMPLISHED



REVISÉD MILESTONE (REVISION NO.)

PROJECT ELEMENTS

[illegible]

EXPENDITURES:

FORECAST
ACTUAL

LOCATION CODE: ()

I = IN-HOUSE
C = CONTRACTOR
A = GOGO
G = GOCO

UNITS:
\$ THOUSANDS

FY

PROG

EXPEND

BAL

IN-HOUSE EFFORT
MAN YEARS

CHART 2

CODE:

FINANCIAL STATUS
MMT PROJECT:

DATE:

PROJECT TITLE:

KEY:

EXPEND

OBLIG

UNOBLIG



UNITS: \$ MILLIONS

TOTAL
PROGRAM
FY

FY

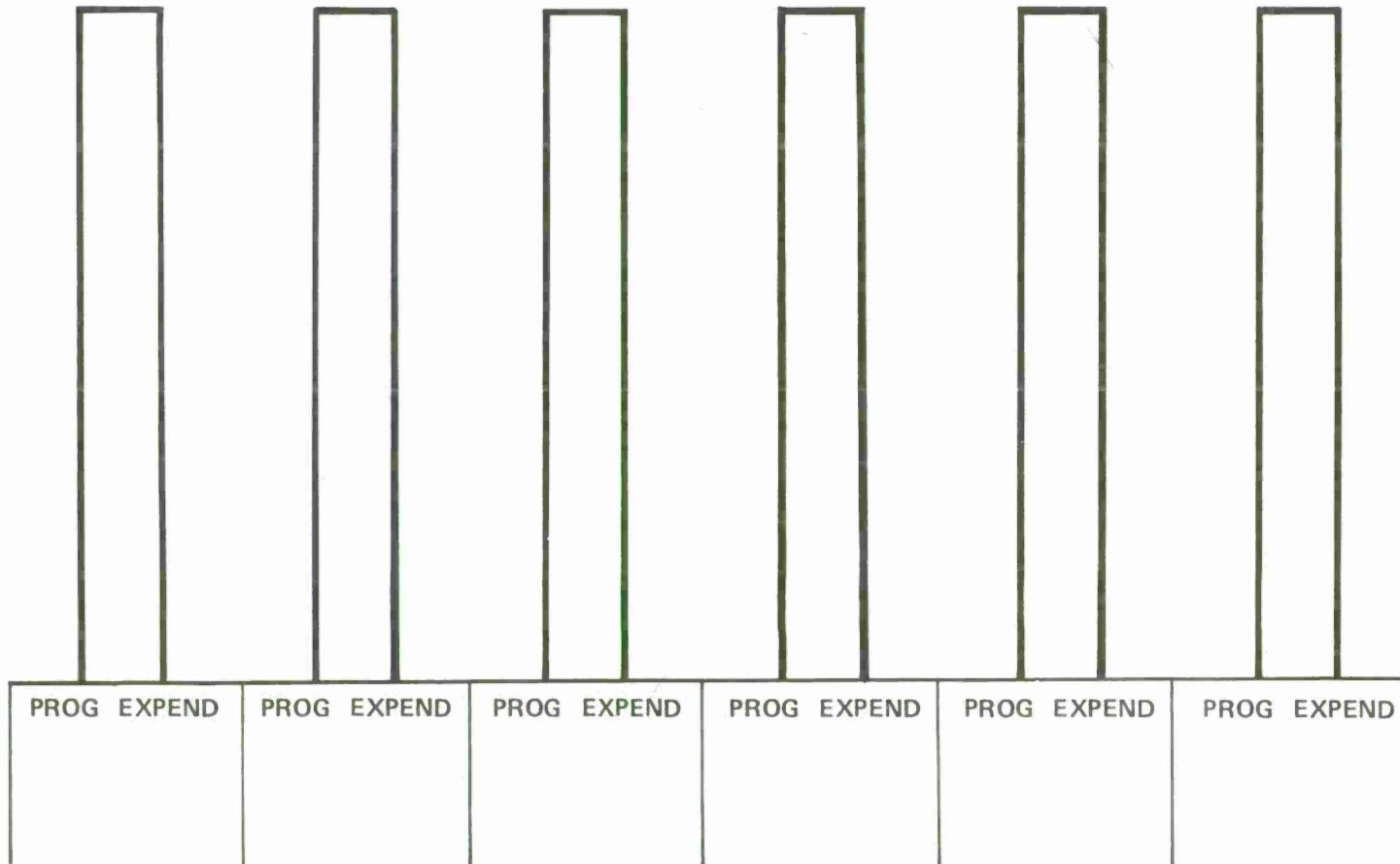
FY

FY

FY

FY

99



IN-HOUSE
CONTRACT
OGA
GOCO

CHART 3

PROJECT SUMMARY
MMT PROJECT:

CODE:

DATE:

PROJECT TITLE: _____

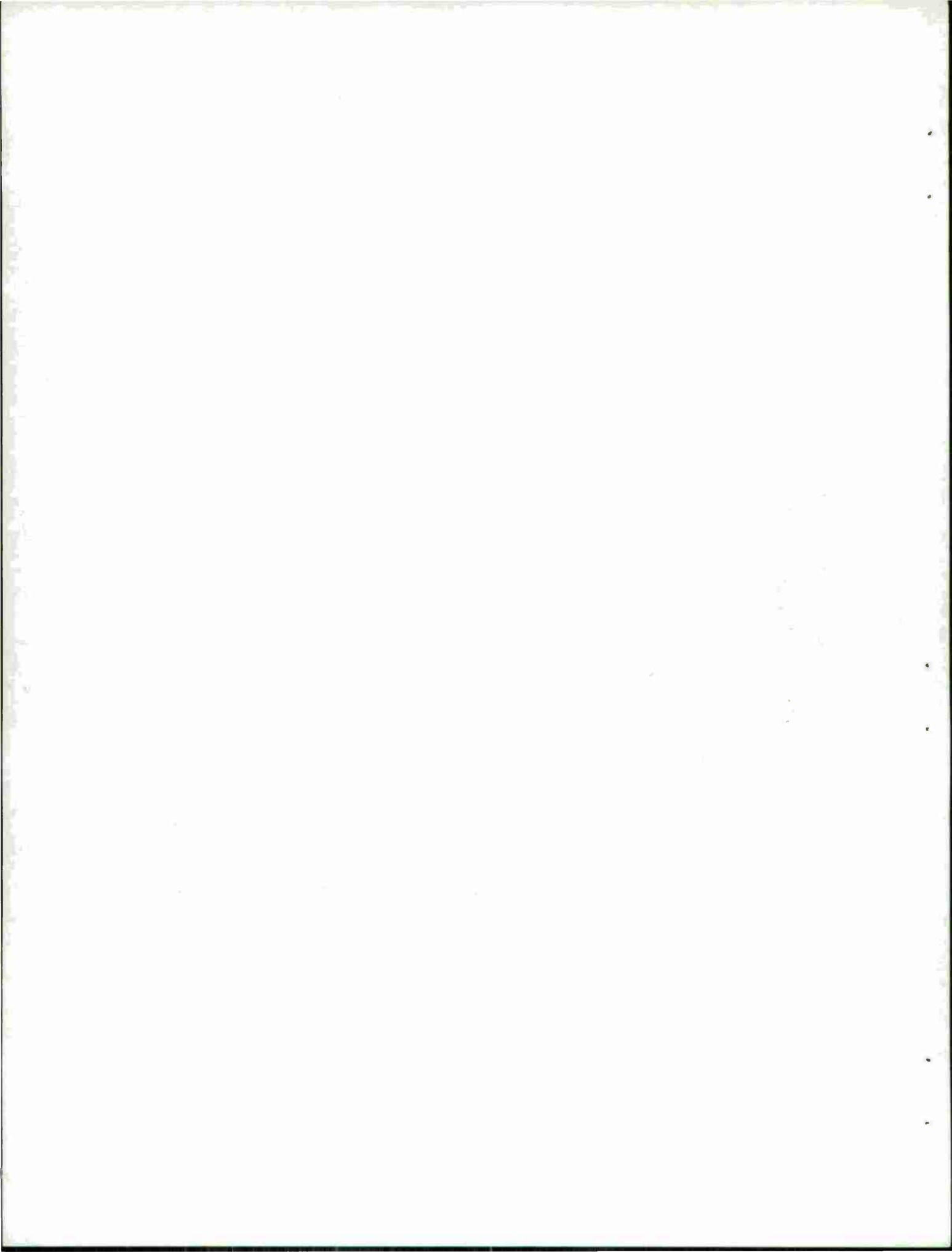
ACCOMPLISHMENTS:

PROBLEM AREAS:

RECOMMENDATIONS/ACTIONS:

ACTION RESPONSIBILITY:

CHART 4



APPENDIX C

COMPUTER PROGRAM

FY75 IN MILLIONS OF DOLLARS									
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
1264	ADVTECHFOR SUPPRESSIVE SHIELDING OF HAZARDOUS PRODSUOP	JRMARSICOVETE	3906	ESPD	19AUG75	0.000	0.000	0.000	0.000
TOTAL =	0.000	TECH AREA IS SAFETY							
4000	AUTOMATED M55 DETONATOR PRODUCTION EQUIPMENT	PHONTELEONE	5389	ESPD	NOV72	.100	0.000	0.000	0.000
TOTAL =	.100	TECH AREA IS LAP							
4009	AUTOMATIC EQUIPMENT FOR A/P OF SMALL SHAPE OCHG ROCKETS	DMHUBBARD	5669	ESPD	23AUG73	.260	.006	.384	0.000
TOTAL =	.650	TECH AREA IS LAP							
4012	ESTAB OF PROTOTYPE OF CONT FINAL ROLL MILL + PAD MAKEUP MACH	EPHUSELTON	4243	ESPD	AUG72	.093	.597	0.000	.009
TOTAL =	.699	TECH AREA IS PROP+EXP							
4013	CONTINUOUS NITROCELLULOSE BY MAGNESIUM NITRATE PROCESS	CHLEWIS	3637	ESPD	AUG71	.110	.003	0.000	0.000
TOTAL =	.113	TECH AREA IS PROP+EXP							
4015	ESTAB OF PROTO SYST FOR CONT PROC OF BENITE	EPHUSELTON	3014	ESPD	AUG71	.082	.108	0.000	0.000
TOTAL =	.190	TECH AREA IS PROP+EXP							
4032	AUTOMATED EQUIPMENT (M739 FUZE)	PDEBARI	5468	NFD	JAN75	0.000	0.000	.750	0.000
TOTAL =	.750	TECH AREA IS FUZE							
4041	AUTOMATED EQUIPMENT FOR HOTAR COMPONENTS	OANDERSON	6279	ESPD	21SEPT71	.228	0.000	.199	0.000
TOTAL =	.427	TECH AREA IS LAP							
4050	AUTOMATED LOADING OF PROPELLANT FLASH REDUCERS	DS DAVIS	3127	ESPD	SEPT73	.219	.135	.713	0.000
TOTAL =	1.07	TECH AREA IS LAP							
4073	PHOTO FLASH COMPS DESENSITIZED BY COATANTS	BWERBEL	3961	ESPD	SEPT73	.150	0.000	0.000	0.000
TOTAL =	.150	TECH AREA IS SAFETY							
4105	AUTO INCR LG ASSY OF PROPGHCSA/CENTICOREIGN	CJCARNALI	4162	ESPD	SEPT72	.071	.025	.429	0.000
TOTAL =	.525	TECH AREA IS LAP							
4114	POLLUTION ABATEMENT METHS FOR P+E	IFORSTEN	2138	ESPD	27DEC68	.612	.978	.271	.004
TOTAL =	.365	TECH AREA IS POLLUTION							
4165	PROTOTYPE FAC FOR RECOVERY OF HMX/ERDX/HMX ADMIXTURES	HRICCI	2160	ESPD	19AUG70	.015	0.000	.450	0.000
TOTAL =	.465	TECH AREA IS PROP+EXP							
4201	SAFETY ENGR IN SUPPORT OF AMMO PLANTS	JRMARSICOVETE	3906	ESPD	FY71	.213	.149	.353	.285
TOTAL =	1.00	TECH AREA IS SAFETY							
4202	PROTO EQUIP CONT AUTO PRODS OF SOLVENT TYPE MULTIBASED NPROP	LPLEMPICKI	3637	ESPD	DEC70	.070	.272	0.000	0.000
TOTAL =	.342	TECH AREA IS PROP+EXP							
4243	INVESTIGATION OF LOADING AMATEX20	PSKERCHOCK	4252	ESPD	FY74	2.230	.487	.181	.372
TOTAL =	3.27	TECH AREA IS PROP+EXP							
4249	SEPOFFINEE XP LFROS PENTACID +/OR WATERS LURRIES	SDOLLMAN	3717	ESPD	SEPT73	.025	0.000	0.000	0.000
TOTAL =	.256E-01	TECH AREA IS PROP+EXP							
4252	IMPROVE PRESENT PROC FOR MFG OF ERDX+HMX	SDOLLMAN	3717	ESPD	SEPT73	.014	.171	.331	0.000
TOTAL =	.516	TECH AREA IS PROP+EXP							
4263	AUT CPILOT LINE F/CONT COOL + PROCHLO PROJ	OJANDERSON	3162	ESPD	19NOV73	.705	0.000	.570	.025
TOTAL =	1.30	TECH AREA IS LAP							
4267	CONT PROCESS FOR GRANULAR COMPS	LSOTSKY	2160	ESPD	OCT74	.040	.040	0.000	0.000

TOTAL =	.800E-01 TECH AREA IS PROP+EXP								
4271	IMPDPACFORPOLISHORY+GLAZINGOFBLACKPOWDER	BDSTRAUSS	3314 ESPD	9OCT74	.019	.140	0.000	0.000	
TOTAL =	.159 TECH AREA IS PROP+EXP								
4277	NEWDAONFROCFORHMXMFG	SDOLLMAN	3717 ESPD	JUN75	.063	.003	.351	0.000	
TOTAL =	.417 TECH AREA IS PROP+EXP								
4281	METHOGSFORCONSERVATIONOFENERGYATARMYAMMOPLANTS	JMSWOTINSKY	3998 ESPD	22SEPT75	0.000	0.000	.191	0.000	
TOTAL =	.191 TECH AREA IS ENERGY								
4310	DMSORECRYSTALLIZATIONOFHMX/ROX	HRICCI	2160 ESPD	FEB75	.170	.285	0.000	.010	
TOTAL =	.465 TECH AREA IS PROP+EXP								
6211	SINTEREDSTEELPREFORMFORWORKINTOFRAGTYPESHELLBODIES	JWBURLINGAME	2596 M+MTD	SEPT73	.165	.002	0.000	.055	
TOTAL =	.222 TECH AREA IS MPTS								
6329	AUTOMOTFOR SOUNDNESSOFMATL FORFRES+PUTGENARTPROJS	KIYER	3679 MSD	OCT74	.085	0.000	0.000	0.000	
TOTAL =	.850E-01 TECH AREA IS MPTS								
6472	APPROFALTPROCFORFABOFPRECISIGNPINIONSUSEDINMTFUZES	DJREAP	4389 MSD	FY74	.054	0.000	.345	0.000	
TOTAL =	.406 TECH AREA IS FUZE								
6558	(CAMRELATED)ADAPTATIONOFAUTOFUZEREGULATION	TMCKIMM	3265 NFD	FY74	.225	0.000	.069	.021	
TOTAL =	.315 TECH AREA IS FUZE								
6562	FEASIBILITYOFUSINGGGNTCASTSTEELFORAMMOMETALPTSMFG	GSALLADE	2522 MSD	NOV73	.150	0.000	0.000	0.000	
TOTAL =	.150 TECH AREA IS MPTS								
7556	DEVOFPROTOPRODESRFACILITIES	VCOLANGELO	5517 BWL	SEPT74	.139	0.000	.111	0.000	
TOTAL =	.250 TECH AREA IS MPTS								

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 6.307

GOCO = 2.501

CONTRACTS = 5.699

OTHER AGENCY = .781

TOTAL = 15.288

DIVISION

ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD	
5.489	.249	0.000	.225	.139	.165	IN HOUSE
2.499	0.000	0.000	0.000	0.000	.002	CONTRACTS
5.173	.346	0.000	.069	.111	0.000	GOCO
.785	0.000	0.000	.021	0.000	.055	OGA
13.066	.635	0.000	.315	.250	.222	TOTAL

-----LCWSL MMT-----

		FY76	IN MILLIONS OF DOLLARS						
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
1264	ADVTECHFOR SUPPRESSIVE SHIELDING OF HAZARDOUS PRODSUPOP	JRMARSIGOVETE	3906	ESPD	19AUG75	.638	0.000	.169	.643
TOTAL = 1.45 TECH AREA IS SAFETY									
4000	AUTOMATED M55 DETONATOR PRODUCTION EQUIPMENT	PMONTELONE	5389	ESPD	NOV72	.409	.001	.590	0.000
TOTAL = 1.00 TECH AREA IS LAP									
4009	AUTO OF EQUIP FOR A/P OF SMALL SHAPE CHARGER ROCKETS	DHUBBARD	5609	ESPD	23AUG73	.261	.030	.489	0.000
TOTAL = .700 TECH AREA IS LAP									
4013	CONTNITROCELLULOSE BY MAGNESIUM NITRATE PROCESS	CWLEWIS	3637	ESPD	AUG71	.000	0.000	0.000	0.000
TOTAL = .800E-02 TECH AREA IS PROP+EXP									
4032	AUTOMATED EQUIPMENT FOR FUZE	PDEBARI	5468	NFO	JAN75	.153	0.000	.462	0.000
TOTAL = .615 TECH AREA IS FUZE									
4041	AUTOMATED EQUIPMENT FOR MORTAR COMPONENTS	OANDERSON	6279	ESPD	21SEPT71	.221	.010	.192	0.000
TOTAL = .423 TECH AREA IS LAP									
4073	PHOTOFLASH COMPOSITIONS SENSITIZED BY COATANTS	BWERBEL	3961	ESPD	OCT75	.260	0.000	0.000	0.000
TOTAL = .200 TECH AREA IS SAFETY									
4105	AUTO INCR LOG ASSY OF PROPGHSH/CENT COREIGN	CJCARNALI	4162	ESPD	SEPT72	.147	.020	.518	0.000
TOTAL = .685 TECH AREA IS LAP									
4114	POLLUTION ABATEMENT METHODS FOR P+E	I FORSTEN	2138	ESPD	27DEC68	2.151	1.422	.403	.354
TOTAL = 4.33 TECH AREA IS POLLUTION									
4165	PROTOTYPE FACILITY FOR RECOVERY OF HMX/FRDX/HMXADMIX	HRICCI	2160	ESPD	19AUG70	0.000	0.000	.475	0.000
TOTAL = .475 TECH AREA IS PROP+EXP									
4202	PROTO EQUIP FOR CONT AUTO PRODS OF SOLVENT TYPE MULTIBASE CNP	LPLEMPICKI	3637	ESPD	DEC70	.040	.100	0.000	0.000
TOTAL = .140 TECH AREA IS PROP+EXP									
4211	MOD OF PROCESS CONTROL OF EXPLOSIVE COMPOSITIONS	MHALIK	4123	ESPD	SEPT75	.173	.002	0.000	0.000
TOTAL = .175 TECH AREA IS PROP+EXP									
4228	AUTO BAG LOGGING ASSY + PACKOUT (155MM+8)	JSMARZ	2758	ESPD	21AUG71	1.178	.025	.057	0.000
TOTAL = 1.26 TECH AREA IS LAP									
4237	CONTINUOUS TNT PROCESS ENGINEERING	RWOLFF	4122	ESPD	SEPT72	.288	.042	.620	0.000
TOTAL = .950 TECH AREA IS PROP+EXP									
4246	INVESTIGATION OF LOADING AMATEX20	PSKERCHOCK	4252	ESPD	FY74	.637	0.000	.112	0.000
TOTAL = .749 TECH AREA IS PROP+EXP									
4263	AUT CP ILOT LINE F/CONT COOL + PROCHLDG PROJ	CJANDERSON	3162	ESPD	19NOV73	.337	0.000	.693	.115
TOTAL = 1.15 TECH AREA IS LAP									
4271	IMPV OF PROC FOR POLISH DRY + GLAZING OF BLACK POWDER	BDSTRAUSS	3014	ESPD	9OCT74	.116	.132	0.000	0.000
TOTAL = .248 TECH AREA IS PROP+EXP									
4280	M577 FUZE SAUTO PROCESS CONTROL PROTOTYPE EQUIP	JLUBA	2644	NFO	SEPT75	.042	0.000	.166	0.000
TOTAL = .208 TECH AREA IS FUZE									
4281	METHODS FOR CONSERVATION OF ENERGY AT ARMY AMMO PLANTS	JMSHOTINSKY	3998	ESPD	22SEPT75	.413	.174	.247	.041
TOTAL = .875 TECH AREA IS ENERGY									
4284	PROGRAM FLUIDIC CONTROL SYST FOR LAP MACHINERY	SJBERNHARDT	6507	ESPD	OCT75	.168	0.000	.052	0.000

TOTAL =	.160	TECH AREA IS LAP							
4285	INTEQUIVALENCYTESTINSUPPORTOFSAFETYENGFORANMOPLAN	JRMARSICOVETE	3906	ESPD	17SEPT75	.140	.001	.130	.055
TOTAL =	.326	TECH AREA IS SAFETY							
4288	EXPLOSIVESAFESEPARATION+SENSITIVITYCRITERIA	JRMARSICOVETE	3906	ESPD	27JAN77	.164	.020	.167	.229
TOTAL =	.580	TECH AREA IS SAFETY							
4289	HAZARDClassificationsUTOIESOFPROPELLANTS+EXPLOSIVE	JRMARSICOVETE	3906	ESPD	11SEPT75	.054	.071	.125	0.000
TOTAL =	.250	TECH AREA IS SAFETY							
4310	DMSORECRYSTALLIZATIONOFHMX/RDX	HRICCI	2160	ESPD	FE875	.088	.310	0.000	.002
TOTAL =	.400	TECH AREA IS PROP+EXP							
4311	DEVINITIALAUTOPRODEQUIPFORLAFOFXM692MINEOISPSYSTEM	LWEINER	6506	ESPD	20NOV75	.185	.050	.995	0.000
TOTAL =	1.23	TECH AREA IS LAP							
4337	CURING/MOLDINGPROCESSFORADAM	BFSELITTO	4536	MSD	AUG76	.436	0.000	.061	.007
TOTAL =	.904	TECH AREA IS MPTS							
4338	PROJFORCEVOFAUTOPROC+PROTOEQUIPFORLAPOFM483155MMPR	WFIELD	4422	MSD	19MAY76	.104	.017	.638	0.000
TOTAL =	.759	TECH AREA IS LAP							
4456	COMPUTERIZEDMATERIALPROPERTYDATAINFOSYSTEM	HEPEBLY	4222	ASD	FY76	.030	0.000	.070	0.000
TOTAL =	.100E+00	TECH AREA IS OTHER							
6472	APPROFALTPROCFORFABOFPRECISIONPINIONSUSEDINMTFUZES	DJREAD	4389	MSD	FY74	.054	0.000	.346	0.000
TOTAL =	.400	TECH AREA IS FUZE							
6625	ESTABOFAUTOASSY+INSPECTLINEFORBEEHIVEFUZEMVMTS	DJREAP	4389	MSD	OCT75	.003	0.000	.218	.007
TOTAL =	.228	TECH AREA IS FUZE							
6628	AUTOINSPOFMFUZECOMPONENTS(MOVEMENTPLATES)	TMCKIMM	3265	NFD	OCT75	.046	0.000	.199	.005
TOTAL =	.250	TECH AREA IS FUZE							
6634	ARMORPENETRATORSFCRMAINTANKGUN	GESALLADE	2522	MSD	NOV75	.097	0.000	0.000	.403
TOTAL =	.560	TECH AREA IS MPTS							
6640	PRODCONTROL+QAOFSHAPECHGLINERSBYAUTOX-RAYANALYSIS	FWITT	6345	M+MTD	OCT75	.077	0.000	.056	0.000
TOTAL =	.133	TECH AREA IS MPTS							
6642	INERTIAMELDEOROTATINGBANDSFORPROJBODIES	WSHARPE	3742	MSD	JULY76	.197	0.000	.194	.056
TOTAL =	.447	TECH AREA IS MPTS							
6716	DEVCFMATHMODELOFFORMOPERSFORCUR/EUTARIMPISDESIGNS	FLEE	3679	MSD	APR76	.145	0.000	.150	0.000
TOTAL =	.295	TECH AREA IS MPTS							
6736	TECHRLADINESSACCELTHRUCOMPUTERINTEGMEG(TRACE)	SSHART	3721	MSD	OCT76	.028	0.000	.012	0.000
TOTAL =	.400E-01	TECH AREA IS MPTS							
6759	INVESCFEASOEFILAUTOIRANS+HOTFORMPRESSESFORMORTAR	RJSTOCK	3790	MSD	1NOV77	.015	.117	0.000	0.000
TOTAL =	.132	TECH AREA IS MPTS							
7203	APPLPRODGUNCOMPFOLEASTCOSTTOLAFINISHESRELATED	JRODD	5946	BWL	26AUG7	.052	0.000	0.000	0.000
TOTAL =	.520E-01	TECH AREA IS MPTS							
7236	APPROFRAPIDEATTERATIOCANNONTUBES	PATHORNTON	5249	BWL	OCT75	.152	0.000	.026	0.000
TOTAL =	.178	TECH AREA IS MPTS							
7241	IMPVMTTOFNONINGEQUIPAPROCEDURES	CHROSE	5611	BWL	26AUG7	.107	0.000	.055	0.000
TOTAL =	.162	TECH AREA IS MPTS							
7588	ROTARYFORGEINTEGRATEDPRODTECH	LLIUZZI	5827	BWL	AUG75	.300	0.000	.082	0.000
TOTAL =	.382	TECH AREA IS MPTS							

*****TOTALS MILLIONS OF DOLLARS*****

IN-HOUSE =	9.994
GOCO =	2.544
CONTRACTS =	8.769
OTHER AGENCY =	1.917
TOTAL =	23.224

DIVISION					
ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD
7.956	1.079	.430	.241	.611	.077 IN HOUSE
2.416	.134	6.500	0.000	0.000	0.000 CONTRACTS
6.834	1.619	.070	.827	.163	.056 GOCO
1.439	.473	6.599	.605	0.000	0.000 OGA
17.839	3.305	.100	1.073	.774	.133 TOTAL

TECH AREAS				
IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL
2.956	.153	4.224	.115	7.442
1.606	.117	.636	.466	2.825
2.151	1.422	.403	.354	4.330
1.190	.092	.591	.927	2.800
1.356	.366	1.207	.602	3.145
.296	0.000	1.391	.012	1.701
.413	.174	.247	.041	.875
.630	0.000	.070	0.000	.100

LAP
MPTS
POLLUTION
SAFETY
PROP+EXP
FUZE
ENERGY
OTHER

		IN MILLIONS OF DOLLARS							
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
1264	ADVTECH FOR SUPPRESSIVE SHIELDING OF HAZARDOUS PROC SUPP	JRMARSICOVETE	3906	ESPD	19AUG75	.038	0.000	0.000	.070
TOTAL = .101E+00 TECH AREA IS SAFETY									
4000	AUTOMATED M55 DETONATOR PRODUCTION EQUIPMENT	PMONTELEONE	5389	ESPD	NOV72	.242	.008	0.000	0.000
TOTAL = .250 TECH AREA IS LAP									
4105	AUTOMATIC LOGGING ASSY OF PROPCMGW/CENTCOREIGN	CJCARNALI	4162	ESPD	SEPT72	.225	0.000	0.000	0.000
TOTAL = .225 TECH AREA IS LAP									
4114	POLLUTION ABATEMENT METHODS FOR P+E	IFORSTEN	2138	ESPD	27DEC68	.225	0.000	0.000	.025
TOTAL = .250 TECH AREA IS POLLUTION									
4165	PROTOFACE FOR RECOVERY OF HMX/ERDX/HMX ADMIXTURE	MRICCI	2166	ESPD	19AUG70	0.000	0.000	.400	0.000
TOTAL = .400 TECH AREA IS PROP+EXP									
4202	PROTOQUIP FOR CONTACT AUTO PRODSOLVENT TYP MULTI BASE PROP	LPLEMPICKI	3637	ESPD	DEC70	.063	.219	0.000	0.000
TOTAL = .282 TECH AREA IS PROP+EXP									
4243	SEPOFFINE EXPLERS PENIACID FOR WATER SLURRIES	SDOLLMAN	3717	ESPD	SEPT73	.070	.280	0.000	0.000
TOTAL = .350 TECH AREA IS PROP+EXP									
4252	IMPROVE PRES PROC FORMFG OF RDX+HMX	SDOLLMAN	3717	ESPD	SEPT73	.054	.315	.020	0.000
TOTAL = .369 TECH AREA IS PROP+EXP									
4285	INTEQUIV TEST INSUPPORT OF SAFETY ENG FOR AMMO PLANTS	JRMARSICOVETE	3906	ESPD	17SEPT75	.081	0.000	0.000	0.000
TOTAL = .810E+01 TECH AREA IS SAFETY									
4288	EXPLOSIVES SAFE SEPARATION+SENSITIVITY CRITERIA	JRMARSICOVETE	3906	ESPD	27JAN77	.139	0.000	0.000	0.000
TOTAL = .139 TECH AREA IS SAFETY									
4289	HAZARD CLASSIFICATION STUDIES OF PROP+EXPLOSIVES	JRMARSICOVETE	3906	ESPD	11SEPT75	.051	.014	0.000	0.000
TOTAL = .653E+01 TECH AREA IS SAFETY									
4435	OPERATE PROTO SYST FORM67 PROFCHGE	EOCRANE	5727	ESPD	SEPT76	.125	.375	0.000	0.000
TOTAL = .500 TECH AREA IS LAP									
4444	BODY FORM 42/H46 GRENADE	WFIELD	4422	MSD	JAN78	.086	.003	.447	0.000
TOTAL = .536 TECH AREA IS MPIS									
4457	MULTI TOCLEDIOWALLOADER (CLINNOG 37+AV)	PMONTELEONE	5389	ESPD	18AUG76	.025	.616	0.000	0.000
TOTAL = .641 TECH AREA IS LAP									

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 1.416

GOCO = 1.830

CONTRACTS = .867

OTHER AGENCY = .095

TOTAL = 4.208

DIVISION

ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD	
1.336	.086	0.000	0.000	0.000	0.000	IN HOUSE
2.827	.003	0.000	0.000	0.000	0.000	CONTRACTS
.420	.447	0.000	0.000	0.000	0.000	GOCO
.095	0.000	0.000	0.000	0.000	0.000	OGA
3.672	.536	0.000	0.000	0.000	0.000	TOTAL

TECH AREAS

IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL	
.617	.999	0.000	0.000	1.616	LAP
.086	.003	.447	0.000	.536	MPTS
.225	1.000	0.000	.025	.250	POLLUTION
.301	.014	0.000	.070	.385	SAFETY
.187	.814	.420	0.000	1.421	PROP+EXP
0.000	0.000	0.000	0.000	0.000	FUZE
0.000	0.000	0.000	0.000	0.000	ENERGY
0.000	0.000	0.000	0.000	0.000	OTHER

FY77 IN MILLIONS OF DOLLARS									
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
4000	AUTOMATED M550 DETONATOR PRODUCTION EQUIPMENT	PMONTELEONE	5389	ESPD	NOV72	.558	.417	.025	0.000
TOTAL =	1.00	TECH AREA IS LAP							
4105	AUTO INCR LOG+ASSY OF PROPGNSH/CENT COREIGN	CJCARNALI	4162	ESPD	SEPT72	.390	.139	.056	0.000
TOTAL =	1.39	TECH AREA IS LAP							
4114	POLLUTION ABATEMENT METHODS FOR P+E	IFORSTEN	2138	ESFD	27 DEC 68	.756	.143	.001	.497
TOTAL =	.997	TECH AREA IS POLLUTION							
4202	PROTO EQUIP FOR CONT AUTO PRODSOLVENT TYPE MULTIBASE CPROP	LPLEMPICKI	3637	ESPD	DEC70	.161	.308	0.000	.016
TOTAL =	.505	TECH AREA IS PROP+EXP							
4211	MODERNIZATION OF PROCCNTRL OF EXPLOSIVE COMPS	MHALIK	4123	ESPD	SEPT75	.197	0.000	.230	0.000
TOTAL =	.427	TECH AREA IS PROP+EXP							
4223	APPL ULTRASONIC ENERGY TO DOUBLE BASE PROPEXTR PROCESSES	EPHUSELTON	3014	ESPD	AUG72	.282	.013	.035	0.000
TOTAL =	.330	TECH AREA IS PROP+EXP							
4228	AUTO BAG LOG CHG ASSY+PACK OUT (155MM+8)	JSMARZ	2758	ESPD	21 AUG 71	.253	.147	0.000	0.000
TOTAL =	.400	TECH AREA IS LAP							
4237	CONTINUOUS TNT PROCESS ENGINEERING	RWOLFF	4122	ESPD	SEPT72	.257	0.000	.008	0.000
TOTAL =	.265	TECH AREA IS PROP+EXP							
4252	IMPROVE PRES PROC FOR MFG OF RDX+HMX	SDOLLMAN	3717	ESPD	SEPT73	.206	.414	.264	0.000
TOTAL =	.684	TECH AREA IS PROP+EXP							
4263	AUTO PIL CT LINE F/CONT COOL+PROCHOLDG PROJ	CJANDERSON	3162	ESPD	19 NOV 73	.725	0.000	.150	.025
TOTAL =	.900	TECH AREA IS LAP							
4267	CONT PROCESS FOR GRANULAR COMPS	LSOTSKY	2160	ESPD	OCT74	.071	.429	0.000	0.000
TOTAL =	.500	TECH AREA IS PROP+EXP							
4280	M577 FUZE AUTO PROC+CONTROL PROTO EQUIP	JLUBA	2644	NFD	SEPT75	.155	0.000	.745	0.000
TOTAL =	.900	TECH AREA IS FUZE							
4281	METHODS FOR CONSERVATION OF ENERGY AT ARMY AMMO PLANTS	JMSHOTINSKY	3998	ESPD	22 SEPT 75	.354	.318	.263	.065
TOTAL =	1.00	TECH AREA IS ENERGY							
4285	INTEQUIV TEST IN SUPPORT OF SAFETY ENGR FOR AMMO PLANTS	JRMARSICOVETE	3906	ESPD	17 SEPT	.189	.002	.008	.101
TOTAL =	.380	TECH AREA IS SAFETY							
4288	EXPLOSIVE SAFE SEPARATION+SENSITIVITY CRITERIA	JRMARSICOVETE	3906	ESPD	27 JAN 77	.145	0.000	.385	.070
TOTAL =	.600	TECH AREA IS SAFETY							
4289	HAZARD CLASSIFICATION STUDIES OF PROP+EXPLOSIVES	JRMARSICOVETE	3906	ESPD	11 SEPT 75	.118	0.000	.182	.006
TOTAL =	.306	TECH AREA IS SAFETY							
4291	BLAST EFFECTS IN MUNITION PLANT ENVIRONMENT	JRMARSICOVETE	3906	ESPD	17 OCT 75	.069	0.000	.176	.105
TOTAL =	.350	TECH AREA IS SAFETY							
4310	ONSORECRYSTALLIZATION OF HMX/RDX	HRICCI	2160	ESPD	FEB75	0.000	0.000	.200	0.000
TOTAL =	.200	TECH AREA IS PROP+EXP							
4311	DEVINITIAL AUTO PRODFOR LAPX M592 MINE DISPSYST	LWEINER	6506	ESPD	20 NOV 75	.261	.157	1.035	0.000
TOTAL =	1.45	TECH AREA IS LAP							
4341	IMPROVE CNITROCELLULOSE PURIFICATION PROCESS	BOSTRAUSS	3014	ESPD	APR77	.070	.095	0.000	0.000

TOTAL = .165	TECH AREA IS PROP+EXP								
4343	IMPROVENITROCELLULOSEPROCESSCONTROL	JWLEACH	3836	ESPD	MAY77	.165	.117	0.000	0.000
TOTAL = .382	TECH AREA IS PROP+EXP								
4362	CONTAUTOPOSTCYCLICCONCTFACFORLCCONP3LOADEDPROJS	CJANDERSON	3162	ESPD	11MAY77	.339	.029	.032	0.000
TOTAL = .400	TECH AREA IS LAP								
4410	MFGTUNGSTENPENETRATORSBYTAFERSHAGING	RHULBERT	5291	M+MTD	28MAR77	.025	0.000	.247	.125
TOTAL = .397	TECH AREA IS MPTS								
4416	DEV+PROVEOUTOFALTMFGPROCFORSA(AIGENSS)	ILMCKECHNIE	5453	MSD	APR77	.002	0.000	.119	0.000
TOTAL = .120	TECH AREA IS LAP								
4431	AUTOEQUIPFORMORTARIGNITIONGTS	VJGRASSO	4545	ESPD	15JAN77	.258	.007	.647	0.000
TOTAL = .912	TECH AREA IS LAP								
4462	MCDERNIZEDFADFORMULTIGASEPROP	LPLEMPICKI	3637	ESPD	JUL77	.030	.133	0.000	0.000
TOTAL = .163	TECH AREA IS PROP+EXP								
4481	PYROLYSISOFARMYAMMOPLWNTSOLIDWASTE	RSCOLA	3360	ESPD	18AUG77	.089	.001	.010	0.000
TOTAL = .100	TECH AREA IS OTHER								
6634	ARMORPENETRATORSFORAINTANKGUN	GESALLADE	2522	MSD	NOV75	.092	0.000	.241	.374
TOTAL = .767	TECH AREA IS MPTS								
6643	PRODCONTROL+QASHAPEDCHGELINERBYAUTOX-RAYANALYSIS	FHITT	6345	M+MTD	OCT75	.075	0.000	.061	.029
TOTAL = .165	TECH AREA IS MPTS								
6676	EVALOFAQUAQUENCHUNDERPRODCONDITIONS	DOGUSTAD	2522	MSD	JAN77	.024	.276	0.000	0.000
TOTAL = .388	TECH AREA IS MPTS								
6683	PRODOFTUNGSTENBASEHEAVYALLOYPENETRATORSFORAFHUNIT	RRHULBERT	6291	M+MTD	MAR77	.154	0.000	0.000	.346
TOTAL = .500	TECH AREA IS MPTS								
6716	DEVOFMAHMODEL50FFORMOPERSFORCUR/FUTAHMPTSDESIGNS	FLEE	3679	MSD	APR76	.145	0.000	.150	0.000
TOTAL = .295	TECH AREA IS MPTS								
6777	DEVOFPRODPROCFOR105MMXM710E1	RPOHL	3121	MSD	MAY77	.350	0.000	.050	0.000
TOTAL = .400	TECH AREA IS MPTS								
7213	HIGHSPEEDCHROMIUMPLATINGTECHNIQUE	VPGRECO	5717	BWL	FE877	.027	0.000	.100	0.000
TOTAL = .127	TECH AREA IS MPTS								
7485	APPLPFCHEMICALPROCTCIMPVDSURFACEFINISH	TPOCHILY	5717	BWL	FE877	.147	0.000	0.000	0.000
TOTAL = .147	TECH AREA IS MPTS								
7586	ROTARYFORGEINTERATEOPRODTCH	FANEISER	5507	BWL	OCT77	.155	0.000	.005	0.000
TOTAL = .160	TECH AREA IS MPTS								
7722	ROTARYFORGINGOF8XM201	RMEINHART	5703	BWL	7FE877	.207	0.000	.041	0.000
TOTAL = .248	TECH AREA IS MPTS								
7725	AUTFETTAGEARTYBARRELSPROGBYROTARYFORGING	LLIUZZI	5827	BWL	MAR77	.165	0.000	0.000	0.000
TOTAL = .165	TECH AREA IS MPTS								
7726	APPLROTARYFORGEINTGOPRODTCHBYCOLDGFORGHMFCRGPFH	LLIUZZI	5827	BWL	MAR77	.415	0.000	.177	0.000
TOTAL = .592	TECH AREA IS MPTS								
7727	RECYCLINGOFSCRAFGUNTUGESBYROTARYFORGING	CCALOERONE	4179	BWL	MAR77	.215	0.000	.609	0.000
TOTAL = .224	TECH AREA IS MPTS								
7733	ELIMOFEXTTUBEMACHPRIORTOSHAGEAUTOFRETAGE	HGOODHEIM	5849	BWL	JAN77	.045	0.000	.032	0.000

TOTAL = .470E-01 TECH AREA IS HPTS

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE =	8.481
GOCO =	3.145
CONTRACTS =	6.533
OTHER AGENCY =	1.359
TOTAL =	19.518

DIVISION					
ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD
5.983	.713	0.000	.155	1.376	.254 IN HOUSE
2.869	.276	0.000	0.000	0.000	0.000 CONTRACTS
4.587	.559	0.000	.745	.334	.388 GOCO
.485	.374	0.000	0.000	0.000	.500 OGA
13.524	1.922	0.000	.900	1.710	1.062 TOTAL

TECH. AREAS					
IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL	
2.786	.896	2.863	.025	6.570	LAP
2.241	.276	1.083	.874	4.474	MPIS
.756	.143	.001	.097	.997	POLLUTION
.521	.002	.831	.282	1.636	SAFETY
1.479	1.509	.737	.016	3.741	PROP+EXP
.155	0.000	.745	0.000	.900	FUZE
.443	.319	.273	.065	1.100	ENERGY
.100	0.000	0.000	0.000	.100	OTHER

-----LCMSL MNT-----									
FY78 IN MILLIONS OF DOLLARS									
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	5000	CONT	OGA
4000	AUTOMATED M550 ETONATOR PRODUCTION EQUIPMENT	PMONTELEONE	5389	ESPD	NOV72	.690	.134	.574	.002
TOTAL = 1.40 TECH AREA IS LAP									
4041	AUTO EQUIP FOR MORTAR CMPS	OANDERSON	4582	ESPD	21 SEPT 71	.152	.056	.552	0.000
TOTAL = .760 TECH AREA IS LAP									
4140	REDUCED HT FORGING FOR 8 MOTOR 300 YHM650	CKOBIALKA	5361	MSD	27 APR 78	.002	0.000	.078	0.000
TOTAL = .866E-01 TECH AREA IS MPTS									
4153	DEV FAH METERS FOR INERTIAL WELD ROTATING BANDS	W SHARPE	2809	MSD	MAY 78	.127	0.000	.223	0.000
TOTAL = .350 TECH AREA IS MPTS									
4163	CONTROLLED PRODUCTION SYSTEM FOR 105MM HEAT FM 456A1	PSKERCHOCK	4252	ESPD	30 MAY 78	.074	.125	0.000	0.000
TOTAL = .199 TECH AREA IS LAP									
4214	POLLUTION ENGR FOR 1983-85 REQUIREMENTS	I FORSTEN	2138	ESPD	15 DEC 77	.664	.483	.033	0.000
TOTAL = 1.18 TECH AREA IS POLLUTION									
4220	AUTO BAG LOGGING CASEY + PAGK (155MM + 8)	JSHARZ	2758	ESPD	21 AUG 71	.404	0.000	0.000	0.000
TOTAL = .404 TECH AREA IS LAP									
4237	CONTINT PROC ENGINEERING	RWOLFF	4122	ESPD	SEPT 72	.121	0.000	.009	0.000
TOTAL = .130 TECH AREA IS PROP+EXP									
4249	SEPOFFINE EXPLOSIVE FRACID WATERS LURRIES	SDOLLMAN	3717	ESPD	SEPT 73	.030	.220	0.000	0.000
TOTAL = .250 TECH AREA IS PROP+EXP									
4252	IMPROVE PRES PROC FORMFG OF RDX+HMX	SDOLLMAN	3717	ESPD	SEPT 73	.491	.057	0.000	0.000
TOTAL = .548 TECH AREA IS PROP+EXP									
4263	AUTOPILOT LINE F/CONTGCL+PROC OF MELD CPROJS	CJANDERSON	3162	ESPD	19 NOV 73	.201	0.000	.056	0.000
TOTAL = .257 TECH AREA IS LAP									
4267	IMPROVE D PROC FOR GRANULAR COMPS	LSOTSKY	2160	ESPD	OCT 74	.047	.009	.288	0.000
TOTAL = .344 TECH AREA IS PROP+EXP									
4281	METHODS FOR CONSERVATION AT ARMY AMMO PLANTS	JMSHOTINSKY	3998	ESPD	22 SEPT 75	.239	.681	.139	0.000
TOTAL = 1.06 TECH AREA IS ENERGY									
4285	INTEQUIV TEST FOR SAFETY ENGR FOR AMMO PLANTS	JRMARSICOVETE	3906	ESPD	17 SEPT 75	.235	.044	0.000	.121
TOTAL = .400 TECH AREA IS SAFETY									
4288	EXPLOSIVE SAFE SEPARATION + SENSITIVITY CRITERIA	JRMARSICOVETE	3906	ESPD	27 JAN 77	.459	.017	.134	.216
TOTAL = .826 TECH AREA IS SAFETY									
4289	HAZARD CLASSIFICATION OF PROF/EXPLOSIVES	JRMARSICOVETE	3906	ESPD	11 SEP 75	.093	.005	.111	.005
TOTAL = .214 TECH AREA IS SAFETY									
4310	DMSOR CRYSTALLIZATION OF HMX/RDX	HRICCI	2160	ESPD	FEB 75	.026	.170	0.000	0.000
TOTAL = .196 TECH AREA IS PROP+EXP									
4322	DSGNCRITERIA + SYST CHARACTER OF ELECT CONTL PRODFAC	LWDOREMUS	3084	ASD	SEPT 78	.098	.380	.007	0.000
TOTAL = .185 TECH AREA IS MPTS									
4328	BULK PKG OF SHIPPING CONTR	NSEPRELL	5358	MSD	10 JUL 78	.161	0.000	.040	0.000
TOTAL = .201 TECH AREA IS OTHER									
4341	IMPROVED NITRO CELLULOSE PURIFICATION PROC	BDSTRAUSS	3014	ESPD	APR 77	.090	.575	0.000	0.000

TOTAL =	.665	TECH AREA IS PROP+EXP							
4143	IMPROVEDNITROCELLULOSEPROCCONTL	JMLEACH	3836	ESPD	MAY77	.015	0.000	0.000	0.000
TOTAL =	.150E-01	TECH AREA IS LAP							
4431	AUTOEQUIPFORMORTARIGNCTGS	VJGRASSO	4545	ESPD	15JAN77	.061	.048	.549	0.000
TOTAL =	.656	TECH AREA IS LAP							
4444	BODYFORM42/M46GRENADE	WFIELD	4422	MSD	JAN78	.326	0.000	.330	0.000
TOTAL =	.626	TECH AREA IS MPTS							
4447	NITROGUANIDINEPROCCONTLANALYTICALSYSTS	CWLEWIS	3637	ESPD	18JAN78	.346	.020	.024	0.000
TOTAL =	.390	TECH AREA IS PROP+EXP							
4449	PROCIIMPROVEMENTFORCOMPC+	HRICCI	3760	ESPD	17JAN78	.137	.780	0.000	0.000
TOTAL =	.917	TECH AREA IS PROP+EXP							
4462	MODERNIZEDFADFFORMULTI BASEPROP	LPLEMPICKI	3637	ESPD	JUL77	.090	.502	0.000	0.000
TOTAL =	.592	TECH AREA IS PROP+EXP							
4466	EVALOFTNTCYCLOTOLCCTOLW/ARRADCOMMELTPOURFAC	CBPIPER	6144	ESPD	JAN78	.169	.031	0.000	0.000
TOTAL =	.200	TECH AREA IS LAP							
4469	AUTCINSERTIONOFGRENADELAYERS	RHAUSCHILD	4545	ESPD	JAN78	.216	.011	.275	0.000
TOTAL =	.502	TECH AREA IS LAP							
4472	DEVOLFLQUIPFORAUTO/MECHFABOFCENTGOREPROPAGS	GCHEN	5727	ESPD	DEC77	.067	.013	.135	0.000
TOTAL =	.215	TECH AREA IS LAP							
4498	DEVMETHODFORCONSOL+AUTOASSYOF SMALLMINES	SLOMBARDO	5459	MSD	DEC77	.195	.130	0.000	0.000
TOTAL =	.325	TECH AREA IS LAP							
4508	PROCIIMPROVEMENTOF PRESSRXCOMPS	SDOLLMAN	3717	ESPD	22DEC77	.059	.241	0.000	0.000
TOTAL =	.300	TECH AREA IS PROP+EXP							
6634	MFGPROCF/DUALLOYS-LGCALARMORDEFEATPROJ	CESALLADE	2522	MSD	NOV75	.160	0.000	0.000	.240
TOTAL =	.400	TECH AREA IS MPTS							
6681	PROCPARAMETERFORPRODFORMOFFPROJS	DOGUSTAO	2522	MSD	JAN78	.403	0.000	.195	.002
TOTAL =	.600	TECH AREA IS MPTS							
6683	PRODOFTUNGSTENBASEHEAVYALLOYFENGTRATORSFORAFMUNIT	RRHULBERT	6291	M+MTD	MAR77	.197	0.000	0.000	.330
TOTAL =	.527	TECH AREA IS MPTS							
6725	AUTOIMERTIABANDMACHFORARIMUNITION	RSTANTON	5752	M+MTD	JAN78	.075	0.000	.250	0.000
TOTAL =	.325	TECH AREA IS MPTS							
6736	TECHREADINESSACCEL THRU COMPUTER INTEGRATED MFG (TRACH)	SSHART	3721	MSD	OCT76	.069	.022	.009	0.000
TOTAL =	.100E+00	TECH AREA IS MPTS							
7213	HIGHSPEEDCHROMIUMPLATINGTECHNIQUE	VGRECO	5717	BWL	FEB77	.027	0.000	.100	0.000
TOTAL =	.127	TECH AREA IS MPTS							
7825	ELIMINATIONOFFACILITATINGHONINGOPERATIONS	HGOODHEIM	5649	BWL	JAN78	.133	0.000	0.000	0.000
TOTAL =	.133	TECH AREA IS MPTS							

.....TOTALS MILLIONS OF DOLLARS.....

IN HOUSE = 7.149

GOCO = 4.454

CONTRACTS = 4.081

OTHER AGENCY = .916

TOTAL = 16.600

DIVISION						
ESPO	MSD	ASD	NUC+FUZE	BWL	M+MTD	
5.176	1.443	.598	0.000	.160	.272	IN HOUSE
4.222	.152	.080	0.000	0.000	0.000	CONTRACTS
2.079	.845	.107	0.000	.100	.250	GOCO
.347	.242	0.000	0.000	0.000	.330	OGA
12.621	2.662	.185	0.000	.250	.852	TOTAL

TECH AREAS						
IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL		
2.244	.548	2.141	.002	4.935	LAP	
1.617	.192	1.162	.572	3.453	MPTS	
.064	.483	.733	0.000	1.180	POLLUTION	
.787	.066	.245	.342	1.435	SAFETY	
1.437	2.574	.321	0.000	4.332	PROP+EXP	
.110	3.600	0.400	0.000	0.100	FUZE	
.239	.681	.139	0.000	1.059	ENERGY	
.161	6.696	.240	0.000	.261	OTHER	

		FY79 IN MILLIONS OF DOLLARS							
PN	PROJECT TITLE	ENGINEER	EXT	OIV	START	IN H	GOCO	CONT	OGA
4000	AUTOM550ETONATORPRODUCTIONEQUIPMENT	PMONTELCONE	5389	ESPD	NOV72	1.159	.351	.090	0.000
TOTAL = 1.60 TECH AREA IS LAP									
4007	EVALOFACETICACIDANHYDRIOERECYCLE	DFREEMAN	6349	ESPD	FY79	.062	.254	0.000	0.000
TOTAL = .316 TECH AREA IS POLLUTION									
4024	DESIGNDEVBUILPROTOAUTOASSYMACHM223FUZE	JSHADE	4757	MSD	FY79	.111	0.000	1.021	0.000
TOTAL = 1.13 TECH AREA IS MPIS									
4046	DEVAUTOMETHTOPREFQUANANALOFBLENDEOEXPLSP	PHONTELEONE	5389	ESPD	1JUN79	.237	.070	0.000	0.000
TOTAL = .307 TECH AREA IS LAP									
4051	IMPVDINSTRUMENTATION*CONF/ACIOPLANT	CMCINTOSH	4123	ESPD	FY79	.157	0.000	0.000	0.000
TOTAL = .157 TECH AREA IS PROP*EXP									
4062	AUTOMFGSYSF/MORTARINCRCONTAINERS	PBONNETT	3162	ESPO	DEC78	.126	.011	.370	0.000
TOTAL = .507 TECH AREA IS LAP									
4064	AUTOLAPCPNSF/105MMTANKCARTRIDGES	KELISCHICK	4162	ESPD	DEC78	.181	.085	.996	0.000
TOTAL = 1.26 TECH AREA IS LAP									
4084	OPACITY/MASSEMISSIONSCORRELATIONS	JCLANCY	3404	MSO	DEC78	.017	.010	.094	0.000
TOTAL = .121 TECH AREA IS POLLUTION									
4124	FABOFCONTACTUATIONSYSHOUSINGS	WWEBSTER	5749	MSD	DEC78	0.000	.790	0.000	0.000
TOTAL = .790 TECH AREA IS MPIS									
4137	AUTOLDGOFCRCOREIGNITERS	ODAVIS	2758	ESPO	DEC78	.079	.006	.120	0.000
TOTAL = .205 TECH AREA IS LAP									
4163	CONTROLLEDPRODLOGSYSTFOR105MMHEAT-IN456A1	PSKERCHOCK	4252	ESPD	30MAY78	.387	0.000	.032	0.000
TOTAL = .410 TECH AREA IS LAP									
4189	HIGHFRAGSTEELPRODPROCESS	WSHARPE	2809	MSD	FY79	.058	0.000	.242	.100
TOTAL = .400 TECH AREA IS MPIS									
4194	IMPVDPROCFORPRESSLXL4EXPLCHGS	APALLINGSTON	4464	MSD	FY79	.259	0.000	.068	0.000
TOTAL = .327 TECH AREA IS PROP*EXP									
4214	POLLUTIONENGRF/1983-85REQUIREMENTS	JCANAVAN	4284	ESPO	15DEC77	.716	.533	.020	0.000
TOTAL = 1.27 TECH AREA IS POLLUTION									
4225	REOWATERPOLABATEMENTSYST	JCARRAZZA	3544	ESPD	FY79	.120	.230	0.000	0.000
TOTAL = .350 TECH AREA IS POLLUTION									
4258						0.000	0.000	0.000	0.000
TOTAL = 0. TECH AREA IS POLLUTION									
4263	AUTOPLOTLINEF/CONTCOOL*PROCOFHELDGPROJS	CJANDERSON	3162	ESPD	19NOV73	.329	0.000	0.000	0.000
TOTAL = .329 TECH AREA IS LAP									
4281	CONSERVATIONOFENERGYATARMYAMMOPLANTS	JSHOTINSKY	3998	ESPO	22SEPT75	.562	.713	.010	0.000
TOTAL = 1.29 TECH AREA IS ENERGY									
4285	INTEQUIVTESTF/SAFETYENGRG	PPRICE	3022	ESPO	17SEPT75	.420	0.000	0.000	0.000
TOTAL = .420 TECH AREA IS SAFETY									
4288	EXPLOSAFESEPARATION*SENSITIVITYCRITERIA	RRINDNER	3906	ESPO	27JAN77	.581	.007	.055	0.000

TOTAL = .643	TECH AREA IS SAFETY								
4291 BLASTEFFECTSINMUNITIONPLANTEVIRONMENT	PPRICE	3022	ESPD	17OCT75	.155	0.000	.000	0.000	
TOTAL = .235	TECH AREA IS SAFETY								
4309 TANKAMMO120MM,PROCESSEV	LLEMPICKI	363	ESPD	FY79	.384	.464	0.000	0.000	
TOTAL = .848	TECH AREA IS PROP+EXP								
4310 DMSORLEGYSTALLIZATIONOFMMX/RDX	LSIBERMAN	2160	ESPD	FE875	.389	.094	0.000	0.000	
TOTAL = .483	TECH AREA IS PROP+EXP								
4312 INJECTIONMOLDING/PINEXPLODGE	BPIPER	4252	ESPD	DEC78	.166	0.000	.095	0.000	
TOTAL = .261	TECH AREA IS LAP								
4335 TITANIUMCYROFORCOPPERHEAD	SPERLMUTTER	5749	MSD	FY79	.081	0.000	.330	0.000	
TOTAL = .411	TECH AREA IS MPTS								
4341 IMPNITROCURIFPROC	RBOWMAN	6225	ESPD	FY77	.136	.606	0.000	0.000	
TOTAL = .742	TECH AREA IS PROP+EXP								
4332 IMPROVFORPOTTINGELECTRONICASSYFORGATOR	SPOLANSKI	5569	MSD	1FE879	.005	0.000	.078	0.000	
TOTAL = .830E-01	TECH AREA IS MPTS								
4444 BODYFORM42/M46GRENADE	WFIELD	4422	MSD	DEC78	.082	.231	.025	.225	
TOTAL = .563	TECH AREA IS MPTS								
4059 OPTOFNITROQPARTICLESIZE	CLEWIS	5572	ESPD	FY79	.025	.225	0.000	0.000	
TOTAL = .250	TECH AREA IS PROP+EXP								
4460 CONTHIXER-ILLUMINATCOMPANAL+CONTSYS	RWOLFE	4122	ESPD	FY79	.086	.150	0.000	0.000	
TOTAL = .236	TECH AREA IS PROP+EXP								
4462 MODFAGF/MULTIBASEPROPELLANT	LLEMPICKI	3637	ESPD	JUL77	.132	.396	0.000	0.000	
TOTAL = .528	TECH AREA IS PROP+EXP								
4466 EVALTNTCYCLOTOLOCTOLINMELT-POURFAC	CBPIPER	6144	ESPD	JAN78	.335	0.000	.126	0.000	
TOTAL = .461	TECH AREA IS PROP+EXP								
4469 AUTOINSERTIONOFGRENADELAYERS	RHAUSCHILD	4545	ESPD	JAN78	.075	0.000	.325	0.000	
TOTAL = .400	TECH AREA IS LAP								
4474 DEHUMIDSBPROP	EROZZA	3241	ESPD	FY79	.075	.100	0.000	0.000	
TOTAL = .175	TECH AREA IS ENERGY								
4498 DEVMEHF/CONSOL+AUTOASSYOFSMALLMINES	SLOMBARDO	5348	MSD	DEC77	.068	1.055	.024	0.000	
TOTAL = 1.15	TECH AREA IS LAP								
4508 PROCIMPVHTOPRESSABLERDXCOMP	SOOLLMAN	2160	ESPD	22DEC77	.068	.289	0.000	0.000	
TOTAL = .357	TECH AREA IS PROP+EXP								
6553 ACOUSTICINSPECTEYST	OSEBASTIAN	3527	MSD	FY73	.967	0.000	.028	0.000	
TOTAL = .950E-01	TECH AREA IS MPTS								
6634 MFGPROCF/OU-LGCALARMORDEFATINGPROP	CSALLADE	2522	MSD	NOV75	.242	0.000	.300	0.000	
TOTAL = .542	TECH AREA IS MPTS								
6682 SIMULATIONOFAMMOPONLINES	WONEILL	3121	MSD	DEC78	.170	0.000	0.000	0.000	
TOTAL = .176	TECH AREA IS MPTS								
6683 PDNOFTUNGSTENBASEHEAVYALLOYPENETRATORF/APHUNITIONS	RHULBERT	6291	MSD	MAR77	.146	0.000	0.000	0.000	
TOTAL = .146	TECH AREA IS MPTS								
6716 DEVOFCOMPUTERAIDEDMODOFFORMOPNSF/CUR/FUTMPTSDESIGN	FLEE	3679	MSD	APR76	.026	0.000	.230	0.000	
TOTAL = .366	TECH AREA IS MPTS								
6736 TECHREADINESSACCELTHRUCOMPUTERINTGROMFG(TRACIM)	SSHART	3721	MSD	OCT76	.081	0.000	.175	0.000	

TOTAL =	.256	TECH AREA IS MPTS							
6738	USE OF ULTRA HIGH SURFACE SPEED FINISH REMOVAL ARTY SHELL	RPOHL	6240	MSD	FY79	.132	0.000	.049	0.000
TOTAL =	.181	TECH AREA IS MPTS							
7213	HIGH SPEED CHROMIUM PLATING TECHNIQUE	VGRECO	5717	BWL	FEB77	.153	0.000	.051	0.000
TOTAL =	.204	TECH AREA IS MPTS							
7246	SIMPLIFICATION OF BREECHING MFG HANDLING	JR000	5737	BWL	9MAR79	.058	0.000	.003	0.000
TOTAL =	.610E-01	TECH AREA IS MPTS							
7313	170 OPTIMIZATION OF STEP HEAD TOOLING	PCASEY	5737	BWL	9MAR79	.061	0.000	.016	0.000
TOTAL =	.770E-01	TECH AREA IS MPTS							
7482	MODIFIED R1880 RIFLING GENERATING MACHINE	PCASEY	5737	BWL	9MAR79	.091	0.000	.048	0.000
TOTAL =	.139	TECH AREA IS MPTS							
7724	GROUP TECHNOLOGY OF WEAPONS	HGOODHEIM	5849	BWL	9MAR79	.085	0.000	0.000	0.000
TOTAL =	.650E-01	TECH AREA IS MPTS							
7726	APPROXIMATE FORGE INTG PROD TECH BY COL OF FORGE WARM FORGRFS	HLIUZZI	5827	BWL	MAR77	.349	0.000	.124	0.000
TOTAL =	.473	TECH AREA IS MPTS							
7727	RECYCLING OF SCRAP GUN TUBES BY ROTARY FORGING	CCALDERONE	5443	BWL	MAR77	.221	0.000	.033	0.000
TOTAL =	.254	TECH AREA IS MPTS							
7730	MANUFACTURE OF SPLITTING BREECH SEALS	JR000	5737	BWL	9MAR77	.118	0.000	.022	0.000
TOTAL =	.146	TECH AREA IS MPTS							
8025	ELECTROFILEREADOUT GAGE FOR POWDER CATAHAMBER CONTROL	PCASEY	5737	BWL	9MAR79	.069	0.000	.037	0.000
TOTAL =	.106	TECH AREA IS MPTS							
8107	CREEP FEED CRUSH FORM GRINDING	PCASEY	573	BWL	9MAR79	.066	0.000	.016	0.000
TOTAL =	.820E-01	TECH AREA IS MPTS							

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 9.958

GOCO = 6.678

CONTRACTS = 5.383

OTHER AGENCY = .325

TOTAL = 22.336

DIVISION

ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD	
7.142	1.545	0.000	0.000	1.271	0.000	IN HOUSE
4.584	2.086	0.000	0.000	0.000	0.000	CONTRACTS
2.319	2.714	0.000	0.000	.350	0.000	GOCO
0.000	.325	0.000	0.000	0.000	0.000	OGA

14.045	6.670	0.000	0.000	1.821	0.000TOTAL
TECH AREAS					
IN HOUSE	CONTRACTS	GOCO	DGA	TOTAL	
2.007	1.570	2.052	0.000	6.437	LAP
2.472	1.021	2.870	.325	6.696	MPTS
.915	1.027	.114	0.000	2.056	POLLUTION
1.156	.007	.135	0.000	1.298	SAFETY
1.974	2.224	.194	0.000	4.389	PROP+EXP
1.000	0.000	0.000	0.000	0.000	FUZE
.637	.013	.010	0.000	1.460	SMERGY
0.000	0.000	0.000	0.000	0.000	OTHER

		IN MILLIONS OF DOLLARS						
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT OGA
4000	AUTOMATED DETONATOR PRODUCTION EQUIP	PMONTELEONE	5349	ESPD	FY71	.230	.020	0.000 0.000
TOTAL = .250 TECH AREA IS LAP								
4033	CAUSTIC RECOVERY FROM SODIUM NITRATE SLUDGE	HRICCI	2160	ESPD	FY80	.153	0.000	0.000 0.000
TOTAL = .153 TECH AREA IS PROP+EXP								
4037	PROCESS IMPROVE FOR PLASTIC BONDED EXPLS	SOOLLMAN	3717	ESPD	FY80	.030	.206	0.000 0.000
TOTAL = .236 TECH AREA IS PROP+EXP								
4061	NITROGUANIDINE PROCOPT	ALITTY	4496	ESPD	FY80	.063	.197	0.000 0.000
TOTAL = .260 TECH AREA IS PROP+EXP								
4062	AUTOMATIC SYS FOR MORTAR INCREMENT CONTAINER	PBONNETT	4496	ESPD	FY79	.009	0.000	.875 0.000
TOTAL = .884 TECH AREA IS PROP+EXP								
4084	OPACITY/MASSEMISSION CORRELATION	AFRIEDMAN	4497	MSD	FY79	.111	0.000	0.000 0.000
TOTAL = .111 TECH AREA IS PROP+EXP								
4137	AUTOMATIC LOADING OF CENTER CORE IGNITERS	EMREZ	4162	ESPD	FY79	.670	0.000	0.000 0.000
TOTAL = .670 TECH AREA IS PROP+EXP								
4189	HIGH FRAG STEEL PRODUCTION PROCESS	MSHARPE	3742	MSD	FY79	.464	.644	0.000 .200
TOTAL = 1.25 TECH AREA IS PROP+EXP								
4200	INTERCRYSTALLIZER FOR LARGE CAL MUNITIONS	PBONNETT	4496	ESPD	FY80	.029	0.000	0.000 0.000
TOTAL = .290E-01 TECH AREA IS PROP+EXP								
4210	JET CUTTING OF ENERGETIC MATERIALS	B STRAUSS	3014	ESPD	FY80	.112	.338	0.000 0.000
TOTAL = .450 TECH AREA IS PROP+EXP								
4225	RED WATER POLLUTION ABATEMENT SYSTEM	JCARRAZZA	3544	ESPD	FY79	.084	.071	0.000 0.000
TOTAL = .155 TECH AREA IS POLLUTION								
4226	ONLINE MONITORS FOR WATER POLLUTANTS	RWESTERDAHL	3749	ESPD	FY80	.050	.050	0.000 0.000
TOTAL = .100 TECH AREA IS POLLUTION								
4231	IN HOUSE REUSE OF POLLUTION ABATED WATERS	DFREEMAN	4256	ESPD	FY80	.088	.162	0.000 0.000
TOTAL = .250 TECH AREA IS POLLUTION								
4236	AUTOLACE JACKETS FOR CENTER CORE CHARGES	ELISCHICK	4162	ESPD	FY80	.130	.023	.459 0.000
TOTAL = .612 TECH AREA IS LAP								
4266	MEGINSPECT TEST EQUIP / MAG POWER SUPPLY	MHOLLEY	5378	NED	FY80	.345	0.000	0.000 0.000
TOTAL = .345 TECH AREA IS FUZE								
4281	CONSERVATION OF ENERGY AT ARMY AMMO PLANTS	JSHOTINSKY	3998	ESPD	FY75	.315	.919	0.000 0.000
TOTAL = 1.23 TECH AREA IS ENERGY								
4285	INTSQUIV TEST FOR SAFETY ENGINEERING	PPRICE	3022	ESPD	FY76	.408	0.000	0.000 0.000
TOTAL = .408 TECH AREA IS SAFETY								
4288	EXPLOSIVES SAFE SEPAR SENSITIVITY CRITERIA	RRINDNER	3828	ESPD	FY76	.767	0.000	0.000 0.000
TOTAL = .767 TECH AREA IS SAFETY								
4291	BLAST EFFECTS IN MUN PLANT ENVIRON	PPRICE	3022	ESPD	FY76	.160	0.000	0.000 0.000
TOTAL = .100 TECH AREA IS SAFETY								
4508	PROCESS IMPROVE OF PRESSABLE RDX COMPS	SOOLLMAN	3717	ESPD	FY78	.172	.334	0.000 0.000

TOTAL =	.506	TECH AREA IS PROP+EXP							
4312	INJECTMOLDINGFORPRODUCTIONEXPLOSIVEDG	LMANASSAY	6144	ESPD	FY79	.153	.126	0.000	0.000
TOTAL =	.279	TECH AREA IS LAP							
4322	DESIGN/CHAROFELECTCONTSYSFORPRODFAC	MOOREMUS	3084	ASD	FY78	.257	.237	.000	0.000
TOTAL =	.502	TECH AREA IS MPTS							
4341	IMPROVENITROGELLULOSEPURIFICATIONPROC	MBLAIS	3637	ESPD	FY77	.170	.413	0.000	0.000
TOTAL =	.583	TECH AREA IS PROP+EXP							
4493	DEVMETHFORCONSOLA AUTOASSYOFSHALLMINES	SLOMBARDO	5348	MSD	FY78	.110	.100	.192	0.000
TOTAL =	.392	TECH AREA IS LAP							
6736	TECHREDACCELTHROUGHCOMPUTERINTEGRATEDMFG	SHART	3721	MSD	FY76	.155	0.000	.160	.025
TOTAL =	.340	TECH AREA IS MPTS							
6738	ULTRAHIGHSPEDMETALREMOVERARTILLERYSHLL	RPOHL	3121	MSD	FY79	.117	0.000	.180	0.000
TOTAL =	.297	TECH AREA IS MPTS							
4369	AMMUNITIONFORTHE120MMTANKMAINARMAMENT	JMOLA	3320	ESPD	FY79	.347	.983	2.396	0.000
TOTAL =	3.73	TECH AREA IS OTHER							
4462	MODIFIEDPADF/MULTIBASEPROPELLANT	LLIMPICKI	3637	ESPD	FY77	.341	.509	0.000	0.000
TOTAL =	.650	TECH AREA IS PROP+EXP							
4469	AUTOINSERTIONOFGRENADLAYS	RMAUSCHILD	4545	ESPD	FY78	.225	.125	0.000	0.000
TOTAL =	.358	TECH AREA IS LAP							
4310	DMSORLCRYSTALLIZATIONOFHMX/RDX	LSILBERMAN	2160	ESPD	FY75	.278	0.000	0.000	0.000
TOTAL =	.278	TECH AREA IS PROP+EXP							
7730	MFGOFSLITRING8REECMSEALS	P CASEY	5611	BWL	FY79	.453	0.000	0.000	0.000
TOTAL =	.453	TECH AREA IS MPTS							
7920	CONSOFCRITHATLSFORGUNTUBES	PTHORNTON	5517	BWL	FY80	.236	0.000	0.000	0.000
TOTAL =	.236	TECH AREA IS MPTS							
7925	BOREEVAQUATORBORING	P CASEY	5611	BWL	FY80	.111	0.000	0.000	0.000
TOTAL =	.111	TECH AREA IS MPTS							
7926	HOTISGSTATICPRESSCFLGOROCCOMP	PTHORNTON	5517	BWL	FY80	.216	0.000	0.000	0.000
TOTAL =	.216	TECH AREA IS MPTS							
7927	GENOF8AEEMACHSURFACES	P CASEY	5611	BWL	FY80	.086	0.000	0.000	0.000
TOTAL =	.860E-01	TECH AREA IS MPTS							
7928	ROBTIZEDBENCHOPERS	VMONTUORI	5224	BWL	FY80	.113	0.000	0.000	0.000
TOTAL =	.113	TECH AREA IS MPTS							
8024	HIGHSPEEDABRASIVEBELTGRIND	P CASEY	5611	BWL	FY80	.324	0.000	0.000	0.000
TOTAL =	.324	TECH AREA IS MPTS							
8026	APPLSYNTHQUENCHANTSTOGUNTUBE	PTHORTON	5517	BWL	FY80	.143	0.000	0.000	0.000
TOTAL =	.143	TECH AREA IS MPTS							
8047	PASSTHRUSTEADYRESTFORTUBETURN	P CASEY	5611	BWL	FY78	.269	0.000	0.000	0.000
TOTAL =	.269	TECH AREA IS MPTS							
8057	DUALRIFLINGBROACHREMOVALSYST	P CASEY	5611	BWL	FY80	.215	0.000	0.000	0.000
TOTAL =	.215	TECH AREA IS MPTS							
8059	SALVAGECANNONCOMPSBYELECTRODEPOS	TPOCHILY	5717	BWL	FY80	.152	0.000	0.000	0.000
TOTAL =	.152	TECH AREA IS MPTS							
8060	IMPFGPROCRELTOFINALINSPOFCNTUBES	G GALLO	5453	BWL	FY80	.268	0.000	0.000	0.000

TOTAL = .268 TECH AREA IS MPTS
 8149 ESTPGUGHMOLANKS
 TOTAL = .004E-01 TECH AREA IS MPTS
 8106 LCCALFOWDERCHAMBERBOPINJ
 TOTAL = .594E-01 TECH AREA IS MPTS
 8107 CRECPFEDCUSHFORMGRINDING
 TOTAL = .346 TECH AREA IS MPTS
 8208 MATERIAL HANDLING
 TOTAL = .113 TECH AREA IS MPTS
 8341 HALLOWCYLUTOFFHACH
 TOTAL = .094E-01 TECH AREA IS MPTS
 8342 KLYWAYMILLINGHACH
 TOTAL = .242 TECH AREA IS MPTS

ITEM	QTY	UNIT	PRICE	AMOUNT	AMOUNT	AMOUNT	AMOUNT
P CASEY	5611	BWL	FY80	.009	0.000	0.000	0.000
P CASEY	5611	BWL	FY80	.059	0.000	0.000	0.000
P CASEY	5611	BWL	FY79	.348	0.000	0.000	0.000
HGODDHEIM	5507	BWL	FY80	.113	0.000	0.000	0.000
P CASEY	5611	BWL	FY80	.069	0.000	0.000	0.000
P CASEY	5611	BWL	FY80	.242	0.000	0.000	0.000

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 9.928
 GOCO = 5.457
 CONTRACTS = 4.260
 OTHER AGENCY = .225
 TOTAL = 19.870

DIVISION

ESPD	MSD	ASD	NUC+FUZE	BWL	M+MTD	
4.524	.897	.257	.345	3.505	0.000	IN HOUSE
4.476	.744	.237	0.000	0.000	0.000	CONTRACTS
3.730	.522	.000	0.000	0.000	0.000	GOCO
0.000	.225	0.000	0.000	0.000	0.000	OGA
13.130	2.356	.502	.345	3.505	0.000	TOTAL

TECH AREAS

IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL	
2.824	1.038	1.516	.200	5.578	LAP
3.252	.237	.345	.325	3.862	MPTS
.222	.263	0.000	0.000	.505	POLLUTION
1.275	0.000	0.000	0.000	1.275	SAFETY
2.345	1.997	0.000	0.000	3.345	PRGP+EXP
.345	0.000	0.000	0.000	.345	FUZE
.315	.919	0.000	0.000	1.234	ENERGY
.347	.953	2.396	0.000	3.726	OTHER

-----LCMSL MMT-----									
FY81 IN MILLIONS OF DOLLARS									
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
4076	NONTOXIC PRESERVATIVE FOR WOOD	MSTROUKOFF	2770	MSD	FY80	.344	0.000	0.000	0.000
TOTAL = .344 TECH AREA IS OTHER									
4080	AUTOMATED M55 DETONATOR PRODUCTION EQUIP	P MONTELEONE	5389	ESPD	FY71	.131	.473	0.000	0.000
TOTAL = .604 TECH AREA IS LAP									
4027	COMBINED SOLVENT RECOVERY/ DRYINGS- BPROP	EBOZZA	3241	ESPD	FY80	.119	.264	0.000	0.000
TOTAL = .383 TECH AREA IS PROP+EXP									
4059	OPT OF NITRO PARTICLE SIZE	CLEWIS	5572	ESFD	FY79	.226	.657	0.000	0.000
TOTAL = .883 TECH AREA IS PROP+EXP									
4061	NITRO GUANIDINE PROC OPT	ALITTY	4496	ESPD	FY80	.220	.700	0.000	0.000
TOTAL = .920 TECH AREA IS PROP+EXP									
4062	AUTOMFG SYS F/ MORTAR INCREMENT CONTAINER	P BONNETT	4496	ESPD	FY79	1.575	0.000	0.000	0.000
TOTAL = 1.50 TECH AREA IS LAP									
4137	AUTOMATED LOADING OF CENTER CORE IGNITERS	EMEREZ	4162	ESPD	FY79	.916	.184	0.000	0.000
TOTAL = 1.10 TECH AREA IS LAP									
4145	CONTROL DRYING IN AUTOS BPROP MFG	R MANNO	6522	ESPD	FY81	.333	.219	0.000	0.000
TOTAL = .552 TECH AREA IS PROP+EXP									
4189	HIGH RAG STEEL PRODUCTION PROCESS	M SHARPE	3742	MSD	FY79	.220	.933	0.000	0.000
TOTAL = 1.15 TECH AREA IS MPIS									
4203	TNT CRYSTALLIZER FOR LARGE CAL MUNITION	P BONNETT	4496	ESPD	FY80	.302	0.000	0.000	0.000
TOTAL = .302 TECH AREA IS PROP+EXP									
4210	JET CUTTING OF ENERGY MATERIALS	B STRAUSS	3014	ESPD	FY80	.052	0.000	0.000	0.000
TOTAL = .520E-01 TECH AREA IS PROP+EXP									
4225	RED WATER POLLUTION ABATEMENT SYSTEM	J CARRAZZA	3544	ESPD	FY79	.160	0.000	0.000	0.000
TOTAL = .160 TECH AREA IS POLLUTION									
4226	ONLINE MONITORS FOR WATER POLLUTANTS	R WESTERDAHL	3749	ESPD	FY80	.064	.315	0.000	0.000
TOTAL = .379 TECH AREA IS POLLUTION									
4231	IN HOUSE REUSE OF POLLUTION ABATED WATERS	D FREEMAN	4256	ESPD	FY80	.272	.192	0.000	0.000
TOTAL = .464 TECH AREA IS POLLUTION									
4266	MFG INSPECTION TEST EQUIP/ MAG POWER SUPPLY	M HOLLEY	6378	MFO	FY80	.759	0.000	0.000	0.000
TOTAL = .759 TECH AREA IS FUZE									
4281	CONSERVATION OF ENERGY AT ARMY AMMO PLANTS	J SHOTINSKY	3998	ESPD	FY75	.537	.634	0.000	0.000
TOTAL = 1.17 TECH AREA IS ENERGY									
4285	INTEQUIV TEST FOR SAFETY ENGR MINEERING	P PRICE	3022	ESPD	FY76	.441	0.000	0.000	0.000
TOTAL = .441 TECH AREA IS SAFETY									
4288	EXPLOSIVES SAFE SEPA SENSITIVITY CRITERIA	R RINDER	3028	ESPD	FY76	.720	0.000	0.000	0.000
TOTAL = .720 TECH AREA IS SAFETY									
4298	EVAL OF MEXAMINER CYCLE ON HAAPS-LINE	D FREEMAN	4256	ESPD	FY81	.443	.029	0.000	0.000
TOTAL = .472 TECH AREA IS PROP+EXP									
4309	AMMUNITION FOR THE 120 MMT TANK MAIN ARMAMENT	J MOLA	3320	ESPD	FY79	3.071	.917	0.000	0.000

TOTAL =	3.99	TECH AREA IS OTHER							
4328	BULKPROP SHIPPING CONTAINER	DOOYLE	5358	MSD	FY78	.323	0.000	0.000	0.000
TOTAL =	.323	TECH AREA IS OTHER							
4341	IMPROVEMENTS OF CELLULOSE PURIFICATION PROC	MBLAIS	3637	ESPD	FY77	.519	.246	0.000	0.000
TOTAL =	.765	TECH AREA IS PROP+EXP							
4449	PROCESS IMPROVEMENTS FOR COMPG	HRICCI	3760	ESPD	FY78	.051	.546	0.000	0.000
TOTAL =	.597	TECH AREA IS PROP+EXP							
4508	PROCESS IMPROVEMENTS OF PRESSABLE RDX COMPS	SDOLLMAN	3717	ESPD	FY78	.050	.213	0.000	0.000
TOTAL =	.263	TECH AREA IS PROP+EXP							
6716	DEVELOPMENT OF COMPUTER AIDED DESIGN FOR MOPNS/FUR/FUT MPTS DSGN	FLEE	3679	MSD		.157	0.000	0.000	0.000
TOTAL =	.157	TECH AREA IS MPTS							
6738	ULTRA HIGH SPEED METAL REMOVER ARTILLERY SHELL	RPOHL	3121	MSD	FY79	.057	0.000	0.000	0.000
TOTAL =	.570E-01	TECH AREA IS MPTS							
7724	GROUP TECHNOLOGY OF WEAPONS	HG00DHEIM	5849	BWL	FY79	.224	0.000	0.000	0.000
TOTAL =	.224	TECH AREA IS MPTS							
7916	APPROX FLOW COST MANDREL MATLS	HG00DHEIM	5849	BWL	FY79	.168	0.000	0.000	0.000
TOTAL =	.168	TECH AREA IS MPTS							
7925	BORE VACUATOR BORING	PCASEY	5611	BWL	FY80	.248	0.000	0.000	0.000
TOTAL =	.248	TECH AREA IS MPTS							
7927	GEN OF BASE MACH SURFACES	PCASEY	5611	BWL	FY80	.137	0.000	0.000	0.000
TOTAL =	.137	TECH AREA IS MPTS							
7928	ROBTIZE OF MCHOPRS	VMONTUORI	5224	BWL	FY80	.267	0.000	0.000	0.000
TOTAL =	.267	TECH AREA IS MPTS							
7948	ESTABL CUTTING FLUID CNTRL SYST			BWL	FY81	.163	0.000	0.000	0.000
TOTAL =	.163	TECH AREA IS MPTS							
8030	MFG GUID OF ELASTOMERIC SEALS			BWL	FY81	.085	0.000	0.000	0.000
TOTAL =	.050E-01	TECH AREA IS MPTS							
8034	MFG SHOP FLOOR FEEDBACK SYS			BWL	FY81	.296	0.000	0.000	0.000
TOTAL =	.296	TECH AREA IS MPTS							
8035	COAT TUBES SUPPORT SLEEVES W/ BEADING MATLS			BWL	FY81	.200	0.000	0.000	0.000
TOTAL =	.200	TECH AREA IS MPTS							
8102	APPROX FLOW COST METAL FORGETOWNS COMPS	PTHORNTON	5249	BWL	FY81	.163	0.000	0.000	0.000
TOTAL =	.163	TECH AREA IS MPTS							
8103	HIGH VELOCITY MACHING	HG00DHEIM	5849	BWL	FY81	.068	0.000	0.000	0.000
TOTAL =	.68EE-01	TECH AREA IS MPTS							
8105	ESTROUGHTH BLANKS	P CASEY	5611	BWL	FY80	.307	0.000	0.000	0.000
TOTAL =	.307	TECH AREA IS MPTS							
8106	LEGAL POWDER CHAMBER BORING	PCASEY	5611	BWL	FY80	.159	0.000	0.000	0.000
TOTAL =	.159	TECH AREA IS MPTS							
8107	CREEP FEED CRUSH FORM GRINDING	PCASEY	5611	BWL	FY79	.073	0.000	0.000	0.000
TOTAL =	.730E-01	TECH AREA IS MPTS							
8116	SQUEEZING CAST OF CANNON COMPS	HPONIS	5443	BWL	FY81	.280	0.000	0.000	0.000
TOTAL =	.280	TECH AREA IS MPTS							
8119	DINSTABILITY OF VIBRATORY ENERGY	RFARRARA	5507	BWL	FY81	.099	0.000	0.000	0.000

TOTAL =	.994E-01 TECH AREA IS MPTS							
8120	AFPL0FADATRIAC CONTROL TCH	RMEINHART	5672 BML	FY81	.225	0.000	0.000	0.000
TOTAL =	.225 TECH AREA IS MPTS							
8135	2ND CRUERMFGFORMPNSCOMPS		BML	FY81	.750	0.000	0.000	0.000
TOTAL =	.750 TECH AREA IS MPTS							
8136	IMPVDIMPULSEPROGRMSFORHYDRAULICSIMULATORS		BML	FY81	.000	0.000	0.000	0.000
TOTAL =	.000E-01 TECH AREA IS MPTS							
8151	PORTABLE ENGRAVING SYS	VMONTUORI	5224 BML	FY81	.004	0.000	0.000	0.000
TOTAL =	.040E-01 TECH AREA IS MPTS							
8152	IMPVDANODE STRAIGHTINERSFORCHROMIUMPLTG	TPOCHILY	5717 BML	FY81	.268	0.000	0.000	0.000
TOTAL =	.268 TECH AREA IS MPTS							
8153	IMPVDGUNTUBENTCAPFORROTARYFORG	FHEISER	5649 BML	FY81	.336	0.000	0.000	0.000
TOTAL =	.336 TECH AREA IS MPTS							
8154	DISTRIBUTED NC	GANDERSON	5719 BML	FY81	.337	0.000	0.000	0.000
TOTAL =	.337 TECH AREA IS MPTS							
8341	HOLLOW CYL CUTOFF NACH	P CASEY	5611 BML	FY81	.164	0.000	0.000	0.000
TOTAL =	.164 TECH AREA IS MPTS							

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 17.275

GOCO = 6.522

CONTRACTS = 0.000

OTHER AGENCY = 0.000

TOTAL = 23.797

DIVISION

ESPD	MSD	ASD	NUC+FUZE	BML	M+MTD	
10.202	1.101	0.000	.759	5.213	0.000	IN HOUSE
5.589	.933	0.000	0.000	0.000	0.000	CONTRACTS
0.000	0.000	0.000	0.000	0.000	0.000	GOCO
0.000	0.000	0.000	0.000	0.000	0.000	OGA
15.791	2.034	0.000	.759	5.213	0.000	TOTAL

TECH AREAS

IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL	
2.848	1.314	0.000	0.000	4.162	LAP
5.647	.333	0.000	0.000	6.580	MPTS
.496	.507	0.000	0.000	1.003	POLLUTION
1.161	0.000	0.000	0.000	1.161	SAFETY
2.809	2.217	0.000	0.000	4.306	PROP+EXP
.759	0.000	0.000	0.000	.759	FUZE
.537	.634	0.000	0.000	1.171	ENERGY
3.738	.917	0.000	0.000	4.655	OTHER

		FY82 IN MILLIONS OF DOLLARS							
PN	PROJECT TITLE	ENGINEER	EXT	DIV	START	IN H	GOCO	CONT	OGA
4027	COMBINSOLVENTRECOVERY/DRYINGS-8PROP	EBUZZA	3241	ESDP	FY80	.423	0.000	0.000	0.000
TOTAL = .423 TECH AREA IS PROP+EXP									
4033	CAUSTICRECOVERYFRSODIUMNITRATESLUDGE	HRIGGI	2160	ESPD	FY80	.286	0.000	0.000	0.000
TOTAL = .286 TECH AREA IS PROP+EXP									
4061	NITROGUANIDINEPROCPRT	ALITTY	4496	ESPD	FY80	.944	0.000	0.000	0.000
TOTAL = .944 TECH AREA IS PROP+EXP									
4062	AUTOMFGSYSF/MOTARINCREMENTCONTAINER	PBONNETT	4496	ESPD	FY79	1.439	0.000	0.000	0.000
TOTAL = 1.44 TECH AREA IS LAP									
4071	EXPLOSIVEDUSTHAZARDSINMUNITIONSPLANTS	RRINDNER	4469	ESPD	FY80	.322	0.000	0.000	0.000
TOTAL = .322 TECH AREA IS SAFETY									
4078	UPGRADEMELTPOURSAFETY/READINESS/PROD	PSKERCHOCK	4252	ESPD	FY82	.875	0.000	0.000	0.000
TOTAL = .875 TECH AREA IS PROP+EXP									
4086	REPROCESSINGEXPLOSIVEFINES+DRILLSCRAP	CANDERSON	5839	ESPD	FY80	.633	0.000	0.000	0.000
TOTAL = .633 TECH AREA IS PROP+EXP									
4138	EQUIPF/AUTOPROCOFADDITIONELINER	RHAND	2756	ESPD	FY82	.379	0.000	0.000	0.000
TOTAL = .379 TECH AREA IS LAP									
4145	CONTLGRYINGINAUTOS8PROPMEG	RMANNO	6522	ESPD	FY82	.272	0.000	0.000	0.000
TOTAL = .272 TECH AREA IS PROP+EXP									
4189	HIGHFRAGSTEELPRODUCTIONPRCESS	MSHARPE	3742	MSD	FY79	.493	0.000	0.000	0.000
TOTAL = .493 TECH AREA IS HPTS									
4224	ENERGYCONSINSOLRECOVERYOPERATIONS	EKRAJKOWSKI	3241	ESPD	FY82	.229	0.000	0.000	0.000
TOTAL = .229 TECH AREA IS POLLUTION									
4227	DISPOSALOFWASTEWATERTREATMENTSLUDGE	OCOLITTI	3544	ESPD	FY82	.431	0.000	0.000	0.000
TOTAL = .431 TECH AREA IS POLLUTION									
4229	ADVANCEDPINKWATERTREATMENT	B JACKSON	3749	ESPD	FY82	.379	0.000	0.000	0.000
TOTAL = .379 TECH AREA IS POLLUTION									
4231	INHOUSEREUSEOF POLLUTIONABATEDWATERS	DFREEMAN	4256	ESPD	FY80	.303	0.000	0.000	0.000
TOTAL = .303 TECH AREA IS POLLUTION									
4237	CONTINTROCEENGINEERING	RWOLFF	4122	ESPD	FY73	.354	0.000	0.000	0.000
TOTAL = .354 TECH AREA IS PROP+EXP									
4251	AUTOMFGOFDELAYASSYF/M549	LWEINER	5538	ESPD	FY82	.993	0.000	0.000	0.000
TOTAL = .993 TECH AREA IS LAP									
4253	PACK/UNPACKMORTARPROPCHARGES	OANDERSON	4626	ESPD	FY80	.614	0.000	0.000	0.000
TOTAL = .614 TECH AREA IS PROP+EXP									
4267	IMPROVEDPROCFORGRANULARCOMP3	LSOTSKY	2160	ESPD	FY75	.757	0.000	0.000	0.000
TOTAL = .757 TECH AREA IS PROP+EXP									
4281	CONSERVATIONOFENERGYIARMYAHMOPLANTS	JSWOTINSKY	3998	ESPD	FY75	1.690	0.000	0.000	0.000
TOTAL = 1.69 TECH AREA IS ENERGY									
4285	INTEQUIVTESTFORSAFETYENGINEERING	PPRICE	3022	ESPD	FY76	.251	0.000	0.000	0.000

TOTAL = .251	TECH AREA IS SAFETY							
4291 BLASTEFFECTSINMUNPLANTENVIRONMENT	PPRICE	3022	ESPD	FY76	.359	0.000	0.000	0.000
TOTAL = .359	TECH AREA IS SAFETY							
4295 TERTIARYTREATMENT	BJACKSON	4488	ESPD	FY82	.152	0.000	0.000	0.000
TOTAL = .152	TECH AREA IS POLLUTION							
4299 EDALOFHEXAMINEREGVGLONHAAP9-LINE	DFREEMAN	4256	ESPD	FY82	.399	0.000	0.000	0.000
TOTAL = .399	TECH AREA IS PROP+EXP							
4309 AMMUNITIONFORTHE120MMTANKMAUNARMAMENT	JMOLA	3320	ESPD	FY79	3.948	0.000	0.000	0.000
TOTAL = 3.95	TECH AREA IS OTHER							
4311 DEVINITIALAUTOPROD FOR LAPN692MINEDISPSYST	LWEINER	6506	ESPD	FY76	.466	0.000	0.000	0.000
TOTAL = .466	TECH AREA IS LAP							
4318 NITRATEESTERSENVIROMENTIMPACT	RRINDNER	6119	ESPD	FY82	.218	0.000	0.000	0.000
TOTAL = .218	TECH AREA IS POLLUTION							
4363 DEVAUTOPRODEQUIPF/SEALM55	PMONTELEONE	5389	ESPD	FY82	.672	0.000	0.000	0.000
TOTAL = .672	TECH AREA IS LAP							
4369 IMPVDPROJCAVITYSURFACE	DGUSTAD	2522	MSD	FY82	.557	0.000	0.000	0.000
TOTAL = .557	TECH AREA IS MPTS							
4374 EXPLSAFETYSHIELDS	JCALTAGIRONE	6119	ESPD	FY82	.197	0.000	0.000	0.000
TOTAL = .197	TECH AREA IS SAFETY							
4385 CENTERCOREIGNITER	ELISCHICK	4162	ESPD	FY82	.542	0.000	0.000	0.000
TOTAL = .542	TECH AREA IS LAP							
4399 INSTRUIN-PROCESSMEASSOLIOIQUIDINT	RMANNO	6522	ESPD	FY82	.166	0.000	0.000	0.000
TOTAL = .166	TECH AREA IS PROP+EXP							
4404 IMPVDRECOFACETICACIOINRDXMFG	IWEISMAN	3859	ESPD	FY82	.250	0.000	0.000	0.000
TOTAL = .250	TECH AREA IS PROP+EXP							
4406 INPV0YEILDOPMMX	RCOLOSTEIN	6622	ESPD	FY82	.655	0.000	0.000	0.000
TOTAL = .655	TECH AREA IS PROP+EXP							
4422 L/APROTOEQUIPCOMBEEFFECTSHUN	JSMARZ	5727	ESPD	FY82	1.162	0.000	0.000	0.000
TOTAL = 1.16	TECH AREA IS LAP							
4429 IMPRS/F/USEOFOMAVAILCOMPSOFNGHTEQUIP	OANDERSON	4626	ESPD	FY82	.379	0.000	0.000	0.000
TOTAL = .379	TECH AREA IS SAFETY							
4445 DETONATERWASTETREATMENT	OCOLITTI	3544	ESPD	FY82	.428	0.000	0.000	0.000
TOTAL = .428	TECH AREA IS POLLUTION							
4446 ADVAIREMISSIONABATEMENT	JCARRAZZA	6349	ESPD	FY82	.418	0.000	0.000	0.000
TOTAL = .418	TECH AREA IS POLLUTION							
4449 PROCIMPROVEMENTFORCOMPC4	HRICCI	3760	ESPD	FY78	.531	0.000	0.000	0.000
TOTAL = .531	TECH AREA IS PROP+EXP							
4452 REPROCESSALUGDEMILEXPL	LHONABLEM	3239	ESPD	FY82	.274	0.000	0.000	0.000
TOTAL = .278	TECH AREA IS PROP+EXP							
4453 DETPRPAGATIONAVOIDF/ENERGETICATLS			ESPD	FY82	.201	0.000	0.000	0.000
TOTAL = .201	TECH AREA IS SAFETY							
4492 WATERDELUGSYSAPLINMUNPLANTS	RRINDNER	6119	ESPD	FY82	.303	0.000	0.000	0.000
TOTAL = .303	TECH AREA IS POLLUTION							
7730 MFGCFSPLITRINGBREECHSEALS	PCASEY	5611	BWL	FY79	.106	0.000	0.000	0.000

TOTAL = .106	TECH AREA IS MPTS								
7926	MOTISOSTATICPRESSCFLCORDCOMP	PTHORNTON	5517 BNL	FY80	.290	0.000	0.000	0.000	
TOTAL = .290	TECH AREA IS MPTS								
8024	HIGHSPEEDABRASIVEBELTGRIND	PCASEY	5611 BNL	FY80	.140	0.000	0.000	0.000	
TOTAL = .140	TECH AREA IS MPTS								
8050	RECYCLEOFSCRAP TUBESBYESR	VCOLANGELO	5517 BNL	FY82	.261	0.000	0.000	0.000	
TOTAL = .201	TECH AREA IS MPTS								
8062	RAPIDINTERNAL THREADING	JR000	5946 BNL	FY80	.338	0.000	0.000	0.000	
TOTAL = .338	TECH AREA IS MPTS								
8102	POWDERMETALLURGYFCRGMPNSCOMPS	PTHORNTON	4129 BNL	FY81	.131	0.000	0.000	0.000	
TOTAL = .131	TECH AREA IS MPTS								
8103	HIGHVELOCITYMACHINING	HG000HEIN	5507 BNL	FY82	.036	0.000	0.000	0.000	
TOTAL = .360E-01	TECH AREA IS MPTS								
8106	LG CAL POWDERCHAMBERGRIND	GCONLON	5611 BNL	FY80	.071	0.000	0.000	0.000	
TOTAL = .710E-01	TECH AREA IS MPTS								
8117	SHAPEDCASTINGSOFESRSTEEL	VCOLANGELO	5517 BNL	FY82	.204	0.000	0.000	0.000	
TOTAL = .204	TECH AREA IS MPTS								
8151	PORTABLEENGRAVINGSYS	VONTUORI	5224 BNL	FY81	.168	0.000	0.000	0.000	
TOTAL = .168	TECH AREA IS MPTS								
8237	CARRIERHOUSINDMACHININGOFFIVOTHLES	RDEMO	5737 BNL	FY82	.101	0.000	0.000	0.000	
TOTAL = .101	TECH AREA IS MPTS								
8238	BORINGBRECHRINGLUGS	AWAKEULENKO	5611 BNL	FY82	.200	0.000	0.000	0.000	
TOTAL = .200	TECH AREA IS MPTS								
8239	IMPVDMACHININGOFRAILS	GCONLON	5737 BNL	FY82	.250	0.000	0.000	0.000	
TOTAL = .250	TECH AREA IS MPTS								
8241	COMPUTERDIAGACNTLFORBOREGUIDANCE	MSULLIVAN	5517 BNL	FY82	.303	0.000	0.000	0.000	
TOTAL = .303	TECH AREA IS MPTS								
8242	DUALPRESSSTRAIGHTENINGGUNTUBE	RFARRARA	5507 BNL	FY82	.118	0.000	0.000	0.000	
TOTAL = .118	TECH AREA IS MPTS								
8243	COMPUTRECNLFORELECTRODEPOSITIONSYS	TPOCHILY	5187 BNL	FY82	.296	0.000	0.000	0.000	
TOTAL = .296	TECH AREA IS MPTS								
8244	OPTHEATTREATMENTOFROTARYFORGEDTUBES	CCALDERONE	4179 BNL	FY82	.286	0.000	0.000	0.000	
TOTAL = .286	TECH AREA IS MPTS								
8245	APPROFEROSSIONRESISTLCCHROMIUMPLATE	GO+ANDREA	5003 BNL	FY82	.237	0.000	0.000	0.000	
TOTAL = .237	TECH AREA IS MPTS								
8246	GASCHECKSEATFINISHING	CLAROSS	5590 BNL	FY82	.151	0.000	0.000	0.000	
TOTAL = .151	TECH AREA IS MPTS								
8252	INDUCTIONHEATINGOFVARYINGDIAPREFORM	DGCONCORDIA	5872 BNL	FY82	.237	0.000	0.000	0.000	
TOTAL = .237	TECH AREA IS MPTS								
8253	MACHTOOLDYNMEAS+DIAG	RNHARTON	5872 BNL	FY82	.187	0.000	0.000	0.000	
TOTAL = .187	TECH AREA IS MPTS								
8254	IMPVDNEGPROCFORFIRECNLREG	BROSE	5611 BNL	FY82	.257	0.000	0.000	0.000	
TOTAL = .257	TECH AREA IS MPTS								
8341	HOLLOWCYCLCUTOFFMACH	JR000	5946 BNL	FY80	.600	0.000	0.000	0.000	

TOTAL = .600 TECH AREA IS MPTS

*****TOTALS MILLIONS OF DOLLARS*****

IN HOUSE = 29.256

GOCO = 0.000

CONTRACTS = 0.000

OTHER AGENCY = 0.000

TOTAL = 29.256

DIVISION

ESPD	MSD	ASD	NUG+FUZE	BWL	M+MTD	
23.298	1.050	0.000	0.000	4.908	0.000	IN HOUSE
0.000	0.000	0.000	0.000	0.000	0.000	CONTRACTS
0.000	0.000	0.000	0.000	0.000	0.000	GOCO
0.000	0.000	0.000	0.000	0.000	0.000	OGA
23.298	1.050	0.000	0.000	4.908	0.000	TOTAL

TECH AREAS

IN HOUSE	CONTRACTS	GOCO	OGA	TOTAL	
5.724	0.000	0.000	0.000	5.724	LAP
5.887	0.000	0.000	0.000	5.887	MPTS
2.851	0.000	0.000	0.000	2.851	POLLUTION
1.709	0.000	0.000	0.000	1.709	SAFETY
7.437	0.000	0.000	0.000	7.437	PROP+EXP
0.000	0.000	0.000	0.000	0.000	FUZE
1.690	0.000	0.000	0.000	1.690	ENERGY
3.948	0.000	0.000	0.000	3.948	OTHER

98

126476	1BLASTENVIR (APPLTECH)	JAN76/JAN76JUN76/JUN76	E
126476	2BLASTSUPPRESSION	JAN76/JAN76JUL76/JUL76	E
126476	3FRAGENVR	JAN76/JAN76DEC76/DEC76	E
126476	4FRAGSUPPRESSION	JAN76/JAN76DEC76/DEC76	E
126476	5ANALOG GROUP SHIELD DATA	JAN76/JAN76OCT77/JAN78	E
126476	6STRUCTURAL RESPONSE	JAN76/JAN76DEC76/DEC76	E
126476	1FINISHES (SUPPORT ENGR)	JAN76/JAN76MAR76/MAR76	E
126476	2LINERS	JAN76/JAN76MAR77/MAR77	E
126476	3UTILITIES	JAN76/JAN76SEP76/DEC76	E
126476	4REHABILITATION+REPAIR	JAN76/JAN76SEP76/DEC76	E
126476	5ENVIRONMENT FACTORS	JAN76/JAN76SEP76/DEC76	E
126476	1PLANT STUDY (OPFRAPPLS)	DEC76/DEC76OCT76/OCT76	E
126476	2ECONOMAL	MAR75/MAR75DEC76/DEC76	E
126476	3APPLANAL	MAR75/MAR75SEP77/MAR77	E
126476	1PREPARE PLANS (HDBK)	JUL76/JUL76JUL76/JUL76	E
126476	2PREP DRAFT	AUG76/SEP76MAY77/MAY77	E
126476	3REVISED DRAFT	JUN77/AUG77JUL77/AUG77	E
126476	4SAFETY APPV SUBMISSION	SEP77/SEP77OCT77/OCT77	E
126476	1MOD GROUP 3 SHIELD TO PERAPPLS	DEC76/DEC76JUN77/AUG77	E
126476	2OSGNGROUP 1 SHIELD	DEC76/DEC76JUN77/SEP77	E
126476	1PROPTESTSGROUP 5 SHIELD (SUPPORT ENGR)	FEB77/FEB77JUN77/FEB78	E
400071	STUDY OF AVAIL TECH+ EQUIP FOR DET PROD	NOV72/NOV72JUN73/JUN73	E
400071.73	CONCEPT OF NEW TECHNIQUES+ EQUIP	MAR73/MAR73JUN74/JUN74	E
400073.74	EVALUATE CONCEPT PROOF MODELS	AUG73/AUG73DEC74/DEC74	E
400074.77	CONDUCT FREEFLOW NO QUALITY TEST PROG	AUG76/AUG76JUL78/MAR78 (ADD)	E
400074.77	LODELEIN/PA13 SHIP STORE+TEST	MAR79/MAR79DEC80/ (DEL)	E
400075.76	AWARD CONTRACT	FEB75/JAN75AUG75/DEC75	E
400076	DEVELOP SYSTEM CONCEPT	JAN76/JAN76APR76/NOV76	E
400076	DEVELOP PROTOTYPE CONCEPT	SEP75/JUN76DEC75/MAY76 (ADD)	E
400076	APPV SYSTEM CONCEPT	(DEL)	E
400076	APPV CONCEPT	NOV75/MAY76APR76/MAY76	E
400076	DESIGN PILOT LINE	APR76/JUN76OCT76/DEC76	E
400076	APPV PILOT LINE DESIGN	JUL76/MAR77OCT76/MAR77	E
400076	PREPARE SCOPE OF WORK (PHASE 1)	SEP76/SEP76DEC76/DEC76 (ADD)	E
400076.77	DESIGN BUILD+TEST INSPECT EQUIP	JUL76/ DEC76/ (DEL)	E
400076.77	BUILD PILOT LINE	OCT76/ MAR78 (DEL)	E
400076.77	COMPIOW CHARACTERIZATION PROG	MAR76/MAR76OCT77/NOV77 (ADD)	E
400077.76	APPV DESIGN	JUL76/MAR77OCT76/MAR77 (ADD)	E
400077	LOADER CONCEPT COMPARISON	OCT76/OCT76MAR77/MAR77 (ADD)	E
400077	AWARD CONTRACT (PHASE 1)	JUN78 (DEL)	E
400077	CONC+DSGNAUTOINSPECT EQUIP FOR EMPTY DET CUP	SEP77/SEP77MAR78/MAR78 (ADD)	E
400077.78.79	FAB+TEST AUTOINSPECT EQUIP FOR EMPTY CUPS	MAR78/MAR78SEP80/ (ADD)	E
400077	CONC+DSGNAUTOINSPECT EQUIP FOR ASSEMB DET	SEP77/SEP77MAR78/JAN79 (ADD)	E
400077.78.79	FAB+TEST AUTOINSPECT FOR ASSEMB DET	MAR78/APR79DEC80/ (ADD)	E
400077	CONC+DSGNAUTOPKG+PACK EQUIP	OCT77/NOV77MAR79/ (DEL)	E
400077.78.79	FAB+TEST AUTOPKG+PACK EQUIP	MAR79/ SEP80/ (DEL)	E
400077	INITIATE HOT MELT SEAL OF DETS PROGRAM	OCT77/ APR78/ (DEL)	E
400077.78.79	LOAD SEAL+TEST HOT MELT SEAL DET+REV+OP	APR78/ FEB80/ (DEL)	E
400077	HUKITORMULTITON LOADER PROG	JUL77/JUL77DEC79/DEC79 (ADD)	E
400077	CONDMETER ACCUR LIFE+H2O TEST OF IGWABALL	OCT77/ OCT78/ (DEL)	E
400077.78.79	DEV PROCTOOL+ EQUIP FOR ULTRASONIC SEAL DET	NOV78/SEP78SEP80/ (ADD)	E
400077.78	FAB+TEST AUTO DET LACQUER MECHANISM	SEP77/SEP77MAR80/ (DEL)	E
400077.78	FAB+TEST IMPVD VACUUM SYST	SEP77/SEP77AUG79/AUG79 (ADD)	E
400078	REVISE PILOT LINE DESIGN	SEP78/ FEB79 (DEL)	E
400078	AWARD CONTRACT (PHASE 2)	NOV78/ (DEL)	E
400078	TEST+DEBUG	APR78/ AUG78/ (DEL)	E
400078	AWARD CONTRACT (PHASE 3)	NOV79/ (DEL)	E
400078	ACCEPT TEST	AUG78/ SEP78/ (DEL)	E
400078	ASSEMBLY+MODIFY	SEP79/ DEC79/ (DEL)	E
400078	SHIP+INSTALL AT ARRADCOM	SEP78/ MAR79/ (DEL)	E
400078.79	TEST+ EVAL AT ARRADCOM	APR79/ AUG79/ (DEL)	E
400078	PROTOTYPE TECH DATA PACK	SEP78/ OCT78/ (DEL)	E
400078.79	FAB+TEST AUTO EXPLOSIVES+RESUPPLY SYST	SEP77/SEP77JUL78/ (DEL)	E
400078	FAB+TEST IMPVD MACH UNLOAD+TRAY DEVICE	SEP77/ JUL78/ (DEL)	E
400078	FINAL REPORT/TDP	APR79/ MAR81/ (DEL)	E
400079.80.81	FINAL REPORT/TDP	APR79/APR79SEP81/ (ADD)	E

400080	FINALREPORT	AUG79/	NOV79/	(DEL)	E
400080.81	SYSTEMINTEGRATION	MAR80/	MAR81/	(ADD)	E
400079.80	METERINGACCURACY	FEB79/FEB79	APR80/MAR80	(ADD)	E
400077	FINAL30IRPT		SEP80/	(ADD)	E
400078	FINAL30IRPT		SEP80/	(ADD)	E
400079	FINAL30IRPT		DEC80/	(ADD)	E
400080	FINAL30IRPT		JUN81/	(ADD)	E
400081	OVERALLPROJFINAL30IRPT		SEP81/	(ADD)	E
400779	RECEIPTOFFUNDS	JAN79/	JAN79/		E
400779	ENGINEERINGDESIGN	JAN79/	APR79/		E
400779	EQUIPPROUREMENT	MAR79/	JUN79/		E
400779	SOPPREPARATION	MAY79/	JUN79/		E
400779	EQUIPINSTALLATION	JUN79/	JUL79/		E
400779.80	EQUIPOPERATION	AUG79/	FEB80/		E
400780	DATAEVALUATION	OCT79/	FEB80/		E
400780	ECONOMIC EVALUATION	JAN80/	FEB80/		E
400780	DESIGNREVIEW	FEB80/	APR80/		E
400780	PREPAREFINALENGINEERINGREPORT	FEB80/	APR80/		E
400974	ANAL*DEFASSY*PACKCRITERIA	AUG73/SEP73	OCT73/OCT73		E
400974	PROVSYSTCONCEPTCOMP*APPVD	SEP73/SEP73	NOV73/NOV73		E
423680	DELTOLOADPLANT	MAY81/	JUN81/		E
423680	DELTDPAFINALTECHRPT		SEP81/		E
400974	PREPAREINITIALSCOPEOFWORK	NOV73/NOV73	JAN74/JAN74		E
400974	PREPARESCOPESOFWORKFORTASKS1,2+3	NOV73/NOV73	MAR74/MAR74	(ADD)	E
400974	HIGHERAUTHORITYPROCEDUREDECISION	JAN74/JAN74	FEB74/FEB74		E
400974	MODIFYSCOPEOFWORK	FEB74/FEB74	MAR74/MAR74		E
400974	AWARDCONTRACT	FEB74/	JUN74/	(DEL)	E
400974	AWARDCONTRACTFORTASK1	FEB74/FEB74	OCT74/NOV74	(ADD)	E
400974	MODIFYSCOPEOFWORKFORTASK2	JUL74/JUN74	SEP74/SEP74	(ADD)	E
400974	PROTOTYPEDESIGNSUBMITTED	AUG74/	SEP74/	(DEL)	E
400974.75	AWARDCONTRACTFORTASK2	SEP74/SEP74	JUL75/JUN75	(ADD)	E
400974	PROTOTYPEDESIGNAPPVD	SEP74/	OCT74/	(DEL)	E
400974	DSGN*BUILDPROTOEQUIP	OCT74/	MAY75/	(DEL)	E
400974	TESTPROTOEQUIP	MAY75/	JUN75/	(DEL)	E
400974	INSTALLPROTOEQUIPONASSYLINE	JUN75/	AUG75/	(DEL)	E
400974	TEST*EVALUATEPROTOEQUIP	AUG75/	DEC75/	(DEL)	E
400974	TECHDATAPACKAGECOMPLETE	OCT74/	JUN76/	(DEL)	E
400974.75	DSGN*AB*TESTPROTOEQUIPFORTASK2	JUL75/JUN75	NOV77/JUN78	(ADD)	E
400974.75	TECHDATAPKGFORTASK2	OCT74/NOV74	FEB78/OCT79	(ADD)	E
400974.75.76	INSTALLCOMPLETE	NOV77/	DEC77/	(DEL)	E
400974.75.76	PROTOTYPEACCEPTED	DEC77/JAN78	JAN78/AUG78	(ADD)	E
400974.75.76	ALLWORKCOMPLETE	JAN78/DEC78	MAR78/FEB80	(ADD)	E
401273	DSGNEQUIP	DEC72/DEC72	SEP73/AUG73		E
401273	PROCUREEQUIP	JUN73/NOV73	JUN74/FEB76		E
401273	MODBUILDING	MAR74/JAN75	JUN74/NOV75		E
401273	INSTALLEQUIP	JUN74/OCT76	SEP74/FEB76		E
401273	HAZARDSANAL	FEB73/FEB73	DEC74/FEB76		E
401275	RCPTOFADDFUND	NA/NA	MAR75/MAR75		E
401275	INSTALLEQUIP	JUL79/FEB76	DEC75/DEC76		E
401275	DEBUGSYST	SEP76/SEP76	SEP77/NOV79	(ADD)	E
401275	EVALSYST(INERT)	SEP76/AUG78	AUG79/DEC79	(ADD)	E
401275	EVALSYST(LIVE)	DEC79/	DEC79/	(DEL)	E
401275	PREPPRELIMDSGNCRITERIA	JAN79/JAN79	DEC77/MAY80	(ADD)	E
401275	HAZARDSANALYSIS	FEB76/FEB76	JUN76/JUN80		E
401275	GUNFIRINGS	DEC79/	MAR79/	(DEL)	E
401275	FINALRPT	APR76/APR76	JUN76/JUN80		E
402477	CONSTRUCTIEMM483PROJ	OCT77/OCT77	JUN79/		M
402479	PREPSCOPEOFWORK	AUG78/AUG78	SEP78/MAR79		M
402479	RECEIVEFUNDS	OCT78/DEC78	OCT78/DEC78		M
402479	AWARDCONT	APR79/APR79	SEP79/SEP79		M
402479	BUILDMOCKUPS*PROVEOUT	FEB79/	APR79/	(DEL)	M
402479	MAKEDETAILDWGS*SPCS	SEP79/SEP79	JUN80/		M
402479	REVIEWDWGS*SPCS	FEB80/FEB80	JUL80/		M
402479	BUILDPROTO*DERUGG	JUL80/	FEB81/		M
402479	ACCEPTOFFPROTO	FEB81/	JUN81/		M
402479	PRETDP	MAY81/	AUG81/		M

402479	REVIEWTOP	AUG81/	SEP81/	M
403380	DETTHERMALDECOMPSGNPAR	JAN80/	FEB80/APR80/APR80	E
403380	DETEGRPARFORCONVNO2NITRICACID	MAR80/	APR80/JUN80/	E
403380	SUROFININDUSTRIALEQUIP	APR80/	APR80/JUN80/	E
403380	USGNCRIT	JUN80/	OCT80/	E
403380	USGNPILOTPLANT	JUL80/	OCT80/	E
403380	PROJPHYSICOMPL	OCT80/	OCT80/	E
403380	PROJFISCALCOMPL	NOV80/	NOV80/	E
403380	PROJCLOSEOUT	JAN81/	JAN81/	E
404171	ESTABEQUIPDSGNPREPSCOPEINTGW/AUTOLINE	APR72/	JAN72/SEP72/JUN74	E
404171.75.76	AWARDCONTRACT(60MM+81MM)	JUN72/OCT75	JUN72/MAR76	E
404171	TESTPROTOATCONTRACTOR(60MM)	FEB73/	MAR73/ (DEL)	E
404171	USGNMODIFICATIONS(81MM)	MAR73/	APR73/ (DEL)	E
404174	INSTALLPHOTOATROCO(60MM)	APR73/	MAY73/ (DEL)	E
404174	TESTDSGNMOD+EVALRESULTS(60MM)	JUN73/	JUL73/JAN80 (DEL)	E
404174	APPROVEFINALREPORT(60MM+81MM)	AUG73/	AUG73/ (DEL)	E
404174	FINALIZETOP(60MM)	SEP73/	OCT73/ (DEL)	E
404174	FINALIZETOP(81MM)	OCT73/	NOV73/ (DEL)	E
404175.76	DSGNEQUIP(60MM)	JUN72/MAR76	SEP72/ (DEL)	E
404175.76	CONCEPT/DSGNEQUIP(60MM+81MM)	APR76/MAR76	DEC77/JUL78 (ADD)	E
404176	BUILDEQUIP(60MM)+PDRWEIGHFILLHISPUSE	NOV77/	DEC77/JAN79/MAY79 (ADD)	E
404178	AMENDCONTRACTFORBUILDOREMAINSTASPACKO	JAN78/JAN78	JUN78/JUL78 (ADD)	E
404178	BUILDOREMAINPROTOSTASPACKOUT	JUL78/	JUL78/JUL80/ (ADD)	E
404178	TESTPROTOSTASATMAAP	AUG80/	SEP80/ (ADD)	E
404178	FINALIZETOP	JUL80/	SEP80/ (ADD)	E
404679	RECEIPTOFFUNDS	JUN79/JUN79	JUN79/JUN79	E
404679	PROJECTPREPARATION	JUN79/JUN79	JUL79/JUL79	E
404679	INITAUTOANALEQUIPMENTCONCEPTS	JUL79/JUL79	AUG79/AUG79	E
404679	AUTOEQUIPMODELS/DEMO	AUG79/AUG79	SEP79/SEP79	E
404679	CONTRACTAWARDOF EQUIPMFGRS	AUG79/AUG79	JAN80/JAN80	E
404679	DESIGNREVIEW	FEB80/FEB80	FEB80/FEB80	E
404680	SHIP	FEB80/FEB80	MAR80/MAR80	E
404680	INSTALLLEQUIPATRAINATLSAAP	MAR80/MAR80	APR80/APR80	E
404680	DEVELOPMENTOFPROCEDURE	MAR80/MAR80	APR80/APR80	E
404680	DEBUG	APR80/APR80	MAY80/MAY80	E
404680	TESTS	MAY80/MAY80	SEP80/	E
404680	ACCEPTATLONESTAR	SEP80/	OCT80/	E
404680	PROJPHYSICALCOMPLETION	OCT80/	OCT80/	E
404680	PROJFISCALCOMPLETION	OCT80/	NOV80/	E
404680	FINANCIALCLOSEOUT/FINALRPT	SEP80/	NOV80/	E
404680	FINALRPT301		DEC80/ (ADD)	E
405074	PHASE1FEASSTUDYDESIGN	OCT73/OCT73	MAR74/MAR74	E
405074	AWARDCONTRACT	MAR74/MAR74	APR74/APR74	E
405074	FEASIBILITYSTUDY	MAY74/SEP74	NOV74/MAY75	E
405074	PHASE2FLASHREDUCELOADPROTOEQUIP	OCT74/DEC74	NOV74/MAY75	E
405075	AWARDCONTRACTFORPROTOEQUIPFORDSGNTEST	FEB75/JAN76	MAY75/MAR76	E
405075	PROTOEQUIPFABATCONTRACTORPLANT	MAY75/MAR76	MAR79/APR79	E
405075	DELIVERYINSTALL+PROVEPROTOEQUIPATLP	DEC79/	JUN80/ (DEL)	E
405075	FINALIZETECHDATAPKG	DEC79/	SEP80/	E
405075	MODIFYCONTRACTFORPROTOCOMPLETION	MAY78/MAY78	JUL78/JUL78 (ADD)	E
405075	DELPROTOTOTINAA	APR80/MAY80	MAY80/MAY80 (ADD)	E
405075	FINALTECHRPT	JUN80/	SEP80/ (ADD)	E
405075	FINAL301RPT		DEC80/ (ADD)	E
405179	RECPTOFFUNDING		OCT78/DEC78	E
405179	TECHREV+INDSURVEY	JAN79/JAN79	SEP79/SEP79	E
405179	EVALOFINSTRUMENTATION	SEP79/NOV79	NOV79/NOV79	E
405179	DOC+FINALRPT	NOV79/NOV79	JAN80/JUN80	E
405179	PROJPHYSICOMPL		JUN80/JAN80	E
405179	PROJFISCOMPL		JUL80/JAN80	E
405179	PROJCLOSEOUT		AUG80/MAR80	E
405472	FEASSTUDY	APR72/	APR72/	E
405472	MOCKUPDSGN	APR72/	APR72/	E
405472	MOCKUPFAB	MAY72/JUN73	AUG72/JUN73	E
405472	DSGNTEST	APR72/JUN73	SEP72/JUN73	E
405472	LOADPLANTTEST	SEP72/JUL73	OCT72/OCT73	E
405474	AWARDCONTR(PRINTSYS)	MAY74/MAY74	MAY74/MAY74	E

405474	PROTODSGN (PRINTSYS)	MAY74/MAY74SEP74/OCT74	E
405474	PROTOFAB (PRINTSYS)	JUN74/JUN74NOV74/FEB75	E
405474	USGNTST (PRINTSYS)	NOV74/OCT76DEC74/NOV76	E
405474	AWARCONTR (DEFECTSYS)	JUL76/JUL76JUL76/JUL76	E
405474	PROTODSGN (DEFECTSYS)	AUG76/AUG76SEP76/SEP76	E
405474	PROTOTEST (DEFECTSYS)	JAN77/APR77FEB77/MAY77	E
405474	MERGEBOHTSYS	FEB77/MAY77FEB77/MAY77	E
405474	OVERALLSYSTEST	MAR77/JUN77MAR77/SEP77	E
405474	IDPRELTOARRCOM		E
405472	FEASTDY	OCT71/JAN72	E
405472	PROTODSGN	DEC71/SEP72JAN72/SEP74	E
405472	PROTOFAB	JUN72/JUL73SEP72/	E
405472	PROTODSGNTEST	SEP72/ OCT72/	E
405472	PROTLOADPLANTTEST	OCT72/ NOV72/ (DEL)	E
405472	IDPRELTOARRCOM	JAN73/ JAN73/	E
405474	PROTOFAB	JAN75/JAN75	E
405474	PROTOMOD	JAN78/MAY78AUG78/DEC78 (ADD)	E
405474	PROTODSGNTEST	FEB73/MAR73NOV75/DEC78	E
405474	IDPRELTOARRCOM	JAN75/ JAN75/ (DEL)	E
405474	SHIPMACHTOARRADCOM	JUN79/MAR80JUN79/MAR80 (ADD)	E
126476	IBLASTENVIRIAPPLTECH	JAN76/JAN76JUN76/JUN76	E
126476	2BLASTSUPPRESSION	JAN76/JAN76JUL76/JUL76	E
126476	3FRAGENVIR	JAN76/JAN76DEC76/DEC76	E
126476	4FRAGSUPPRESSION	JAN76/JAN76DEC76/DEC76	E
126476	5ANALOG GROUPSHTLDDATA	JAN76/JAN76OCT77/JAN78	E
126476	6STRUCTURALRESPONSE	JAN76/JAN76DEC76/DEC76	E
126476	IFINISHES (SUPPORTENGR)	JAN76/JAN76MAR76/MAR76	E
126476	2LINERS	JAN76/JAN76MAR77/MAR77	E
126476	3UTILITIES	JAN76/JAN76SEP76/DEC76	E
126476	4REHABILITATION+REPAIR	JAN76/JAN76SEP76/DEC76	E
126476	5ENVIRONMENTFACTORS	JAN76/JAN76SEP76/DEC76	E
126476	1PLANTSTUDY (OPFRAPPLS)	DEC76/DEC76OCT76/OCT76	E
126476	2ECOANAL	MAR75/MAR75DEC76/DEC76	E
126476	3APPLANAL	MAR75/MAR75SEP77/MAR77	E
126476	1PREPAREPLANSTHOBK)	JUL76/JUL76JUL76/JUL76	E
126476	2PREPDRAFT	AUG76/SEP76MAY77/MAY77	E
126476	3REVIEWDRAFT	JUN77/AUG77JUL77/AUG77	E
126476	4SAFETYAPPVSURMISSION	SEP77/SEP77OCT77/OCT77	E
126477	1MODORUOP3SHIELD (OPERAPPLS)	DEC76/DEC76JUN77/AUG77	E
126477	2DSGNGROUP1SHIFLD	DEC76/DEC76JUN77/SEP77	E
126477	1PROPTESTSGROUP5SHIELD (SUPPORTENGR)	FEB77/FEB77JUN77/FEB78	E
400779	RECEIPTOFFUNDS	JAN79/ JAN79/	E
400779	ENGINEERINGDESIGN	JAN79/ APR79/	E
400779	EQUIPPROUREMENT	MAR79/ JUN79/	E
400779	SUPPREPARATION	MAY79/ JUN79/	E
400779	EQUIPINSTALLATION	JUN79/ JUL79/	E
400779,8U	EQUIOPERATION	AUG79/ FEB80/	E
400780	DATAEVALUATION	OCT79/ FEB80/	E
400780	ECOTICEVALUATION	JAN80/ FEB80/	E
400780	DESIGNREVIEW	FEB80/ APR80/	E
400780	PREPAREFINAL ENGINEERINGREPORT	FEB80/ APR80/	E
402477	CONDSTOY155MN483PROJ	OCT77/OCT77JUN79/	M
402479	PREPSCOPEOFWORK	AUG78/AUG78SEP78/MAR79	M
402479	RECEIVEFUNDS	OCT78/DEC78OCT78/DEC78	M
402479	AWARCONTR	APR79/APR79SEP79/SEP79	M
402479	BUILDMOCKUPS+PROVEOUT	FEB79/ APR79/ (DEL)	M
402479	MAKEDETAILDWS+SPECS	SEP79/SEP79FEB80/	M
402479	REVIEWDWS+SPECS	FEB80/ APR80/	M
402479	BUILDPROTO+DEBUG	FEB80/ FEB81/	M
402479	ACCEPTOFFPROTO	FEB81/ JUN81/	M
402479	PREPTOP	MAY81/ AUG81/	M
402479	REVIEWTOP	AUG81/ SEP81/	M
402479	FINALTCHRPT	OCT81/ OCT81/	M
402479	FINAL30IRTP	OCT81/ OCT81/	M
405979	SELOFPARTICLESTZEMONITOR	JUL79/JUL79AUG79/AUG79	E
405979	PROCUREMENT	AUG79/AUG79OCT79/NOV79	E

405979	HAZARDSANALYSTS	JUL79/JUL79OCT79/APR80	E
405979	EQUIPMOD	SEP79/SEP79JUL80/	E
405979	INSTALLATION	DEC79/FEB80JUN80/	E
405979	OPERAEVAL	FEB80/FEB80OCT80/	E
405979	FINAL3UIRPT	NOV80/ DEC80/	E
405979	FISCALCOMPLETION	AUG80/ FEB81/	E
405979	PROJECTCLOSEOUT	FEB81/ MAR81/	E
406180	REVPROCPAR	MAY80/MAY80JUL80/	E
406180	REVNSEOPER	AUG80/ OCT80/	E
406180	PREPINTRIMTESTPLAN	MAY80/MAY80NOV80/	E
406180	PREPFINALTESTPLAN	NOV80/ FEB81/	E
406180	CONDUCTHAZARDSANALYSIS	AUG80/ MAY81/	E
406180	APPVFINALTESTPLAN	FEB81/ MAY81/	E
406279	PROCCREV	OCT78/OCT78MAR79/DEC79	E
406279-80	CONTRACTAWARDS	MAY80/MAY80OCT80/	E
406279-80	PROTODSGNCOMPL	OCT80/ JUN81/	E
406279	FINAL3UIRPT	JUL81/ AUG81/	E
406280	SITSEEL	OCT80/ MAR81	E
406281-82	EXERCUNTRPT	APR80/ JUN81/	E
406280	FINAL3UIRPT	SEP81/ OCT81/	E
406281	PROTDCOMPL	JUL81/ DEC81/	E
406281	VENDURTESTCOMPI	JAN81/ APR82/	E
406281	FINAL3UIRPT	MAY82/ JUN82/	E
406282	PROTOINSTALL	MAY82/ SEP82/	E
406282	PROTOACCEPT	OCT82/ JAN83/	E
406282	TDP	JAN83/ FEB83/	E
406280-82	HAZARDSANAL	OCT80/ FEB83/	E
406282	FINALRPT	JAN83/ MAY83/	E
406282	FINAL3UIRPT	JUN83/ JUL83/	E
406479	RECEIPTOFFUNDS	OCT78/DEC78	E
406479	PREPARESCOPEOFWORK	OCT78/OCT78DEC78/DEC78	E
406479	PLACECONTRACT	DEC78/JAN79MAR79/SEP79	E
406479	DESIGNSYSTEM	SEP79/OCT79NOV79/MAY80	E
406479	HAZARDSANALYSIS	SEP79/OCT79JUN80/	E
406479	SAFETYTESTSYSTEM	DEC79/FEB80AUG80/	E
406479	GNFORDEVELOPMENT	SEP79/SEP79SEP79/MAR80	E
406479	TDPDOCUMENTATION	SEP79/SEP79SEP80/	E
406479	SONFORPRODUCTIONLINE	JUN80/ SEP80/	E
406479	FINAL3UIRTP	(ADD)	E
408479	PROCRQST	OCT78/OCT78DEC78/DEC78(ADD)	M
408479	CONTRACTAWARD	JAN79/JAN79JUN79/MAY79(ADD)	M
408479	SURVEY+SAMPLECOLLECTION	JUL79/JUL79SEP79/NOV79	M
408479	LABEVAL+CORRELATION	OCT79/OCT79JUN80/	(DEL) M
408479	ONSITECORRELATIONATGOCOPLANT	JUL80/ DEC80/	(DEL) M
408479	FINALRPTDRAFT	JAN81/ MAY81/	M
408479	FINALRPTPUBLISHED	APR81/ JUN81/	M
410573	PREPCONCEPTOFWORKFEASENGSTUD/DEFS	OCT72/OCT72OCT73/OCT73	E
4105 74	PREPSCOPEOFWORK	JAN73/JAN74MAR73/MAR74	E
4105 74	AWARDCONTRACT	APR73/APR73SEP73/APR74	E
4105 74	FEASSTUDYCOMPLETED	OCT73/JUN74MAR74/MAY74	E
4105 74	PREPARESCOPEOFWORKPHASE2	SEP73/SEP74OCT73/OCT75	E
4105 75	AWARDCONTRACT	DEC74/FEB75FEB75/JUN75	E
4105 75	COMPLETEDSGNFABPROVEOUTPHASE2	MAR75/JUN75OCT75/JUL76	E
4105 76	AWARDCONTRACTPHASE3	JUL75/JUL75DEC75/FEB76	E
4105 76	DSGNASSYINCRMT EQUIP	DEC75/FEB76MAR76/DEC76	E
4105 76	FAB+PROVEOUTINCRMTASSY EQUIP	APR76/APR76NOV76/FEB79	E
4105 77	INSTALL+PROVEOUTASSYINCRMT	DEC76/MAY79MAR77/AUG79	E
4105 77	DEL+TESTINCRMTLOAD+ASSY EQUIP	JUN79/MAY79AUG79/AUG79(ADD)	E
4105 77	AWARDCONTRACTPHASE4	JUL76/JAN77MAR76/JUN77	E
4105 77	DSGNINCRMT PKOUTEQUIP	OCT76/JUN77DEC76/MAR79	E
4105 77	FAB+PROVEOUTINCRMT PKOUTEQUIP	DEC77/APR78AUG80/	E
4105 77	INSTALL+PROVEOUTINCRMT PKOUTEQUIP	JUN77/ SEP77/	E
4105 77	INSTALL+PROVEOUTINCRMTW/INCRMT LODGE	JUL77/ SEP77/	(DEL) E
4105 77	DELIVER+TESTINCRMT PKOUTEQUIPATLOPLANT	JUL80/ SEP80/	(ADD) E
4105 77	FINALIZE TDP	FEB79/FEB79FEB81/	E
410577	FINALPROJSTATRPT	FEB80/MAY80FEB80/JUN80(ADD)	E

411469	PROCNTLCOORDINATE+SUPPORT(TASK1)	JUL68/JUL68	E
411470,73	EVALINCINERATIONMETHODS/EQUIP(VERT)	FEB72/FEB72MAR73/MAR73	E
411470,71	ANALOFVENDORSEQUIP+PROCUREMENT(RAAP)	MAY70/MAY70JUN71/JUN71	E
411470	LITSEARCH,VENDCONTACT(REDWATERDISP)	JAN70/JAN70JUN71/JUN71	E
411470	LABEVAL	DEC70/DEC70JUL71/JUL71	E
411470,71	ID+QUANTOFPROP+ASTES	JUL70/JUL70DEC71/DEC71(ADD)	E
411471	ASSEMBLE+EFFORTWKPLAN+SCHEDULES	OCT70/OCT70JUN71/MAY71	E
411471	INITINVEST+BACKGROUNDSTUDY	NOV70/NOV70SEP71/AUG71	E
411471	PRELIM+FIELDATAACQUISSURVEYS	MAR71/MAR71NOV72/NOV72	E
411471THRU77	COORD+SUPTACTFORIMPL OFABATEPROGS	OCT70/OCT70SEP79/	E
411471	LITSURVEY(PA,INT)	DEC70/DEC70MAR71/MAR71	E
411471	SELTECHFORCONTSUDY	APR71/APR71JUN71/JUN71	E
411471	LABSTUDIES	SEP71/FEB72JUN72/DEC72	E
411471	BENCHSCALEDEMO	JUN72/ JUN73/ (DEL)	E
411471	PRCC+INSTALL OFPROTOEQUIP(RAAP)	DEC71/DEC71JUN72/MAY72	E
411471	EVAL OFPROTOEQUIP	FEB72/MAY72MAY72/DEC72	E
411471	FINALRPT	MAY72/ JUN72/ (DEL)	E
411471	INTERIMRPT	DEC72/JAN73APR73/APR73(ADD)	E
411471	ENGSTUDY+REVITWINCINERATORTECH(PA)	SEP70/SEP70JUN71/JUN71	E
411471	ACTPLUTSCALETACINERATOR(VERT)	JAN71/JAN71SEP71/SEP71	E
411471	LITSEARCH(VAAP)	DEC70/DEC70JUN71/JUN71	E
411471	PURCH INSTRUFORANAL	DEC70/DEC70JUN71/APR71	E
411471	STUDYMETHODFORSE+MEAS	SEP70/SEP70JUN71/JUN71	E
411471	ANALEXISTDATAONCLASSPOLLUTANTS	JAN71/JAN71JUN71/JUN71	E
411471-73	EVALCOMMERAVATEQUIP	JAN71/JAN71DEC72/DEC72	E
411471-73	INSTALL+EVALPPOTO	JAN71/JAN71MAR73/MAR73	E
411471-73	ISSUEINTERIMRPTS	JAN71/JAN71JUN73/JUN73	E
411471	FIELDSTUDYAMHNOX+SO2MONITOR(MONITINS)	DEC71/DEC71JUN72/JUN72(ADD)	E
411472	ARRADCMSELPLANTSURVEYRPTS	SEP71/SEP71OCT72/SEP72	E
411472,73	ANALPRG+ABATTECHS	APR72/MAY72JUL72/JUL73	E
411472,73	FINALRPT	AUG73/SEP73SEP73/MAY74(ADD)	E
411472,73	PERSMALLSCALEFUIDBEDFEASSTUDY	APR72/APR72JUN73/JUN73	E
411472,73	INSTALL+EVAL OFINCINERATORSYST	JUL71/JUL71DEC73/DEC73	E
411472,73,74	SAFETYHAZARDSSTUDY+ASSOCOPEREVAL	JUL71/JUL71DEC73/DEC73	E
411472	PROGFUND	SEP71/SEP71NOV71/NOV71	E
411472	EVALOFREVERSEOSOMOSIS	SEP71/SEP71MAY72/MAY72	E
411472	FINALRPT	MAY72/MAY72JUN72/JUN72	E
411472	CONTPROC(BMI)	MAR72/MAR72AUG72/AUG72	E
411472	PILUTSTOYTOEVALMTMD	JUL71/JUN71DEC71/DEC71	E
411472	STATANALDATA	JAN72/JAN72JUN72/	E
411472,73	THEATOF:ITROCFILULOSEWASTES	SEP71/SEP71JUN73/JUN73(ADD)	E
411472,73,74	DEGRADATIONOFCELLAGENWASTES	JUL72/JUL72FEB75/FEB75(ADD)	E
411472,73	PREPUSGR:PAR+FINALRPT(RAAP)	JUN73/JUN73SEP73/DEC73	E
411472,73	WPTW/RECFORMATERRECY+CONTAMREC(INAAP)	NOV72/FEB73DEC72/MAR73	E
411472,73	ANALDATA/INFORMUSEOFWASTEWATER(BAAP)	OCT73/DEC73NOV73/FEB74	E
411472,73	FINALRPTFORWATERRECY/REUSE(HAAP)	SEP73/DEC73DEC73/MAR74	E
411472	IDENTOF SPLINSTONEEDS(INSTNUTFCM)	JAN72/JAN72JUN73/JUN73(ADD)	E
411472	LABSTUDYAMHNOX+SO2MONITOR	DEC71/DEC71MAR73/MAR73(ADD)	E
411472	EMPISEARCHOFEXPI WASTE INCR(FREEMAN)	NOV71/NOV71JUN72/JUN72(ADD)	E
411472	SFTYCNLUSGNOFFXPLINCR(DUGWAYPG)	JAN73/JAN73JUN73/JUN73(ADD)	E
411472	INTERIMRPTS	JUN72/JUN72MAY73/MAY73(ADD)	E
411472	FISCOBLIG	SEP71/SEP71SEP71/SEP71	E
411472	SURVEYSPLANNED(WATERSURVEYS)	SEP71/SEP71DEC71/DEC71	E
411472,73	SURVEYSCOND	SEP71/SEP71JUN73/JUN73	E
411472,74	ACHARPTS	DEC71/DEC71JUN74/JUN74	E
411472,75	DATAEVAL	DEC71/DEC71SEP74/SEP74	E
411473,74	DATAGAPANALPOLI,UTEMEMOFR7SELGOCOPLANT	NOV72/NOV72DEC75/DEC75	E
411473	USGNCRITERIA+SPEC(SHAAP)	JUL72/JUL72DEC72/JAN73	E
411473	SELCONTRACTOR+TSSUECONTRACT	OCT72/OCT72MAY73/APR73	E
411473	PILUTPLANTDSGN+FAH	MAY73/MAY73OCT73/NOV73	E
411473	PILUTPLANTINSTAL+TIE-IN	NOV73/DEC73DEC73/MAY74	E
411473	PILUTPLANTFEVAL	JAN74/AUG74APR75/JAN78	E
411473	FINALRPT	JAN75/FEB78APR75/DEC79	E
411473THRU76	USGNPRUCINSTALL EQUIP	APR73/APR73AUG78/ (DEL)	E
411473THRU76	USGNPRUCINSTALL REVEQUIP	DEC77/DEC77JUN80/ (ADD)	E
411473	ENGNAPPL	MAR73/MAR73JUL73/AUG73(ADD)	E

411473	DSGN*INSTALLPILOTPLANT(TNTLINE)	APR73/APR73JUN74/	(DEL)	E
411473	DSGN*INSTALLEQUIP(VAAP)	MAR73/MAR73DEC73/JUL74		E
411473	INTERIMRPT-TOTINCINERATIONEFFORT	APR72/APR73SEP73/SEP73		E
411473THMU76	FLUIDBEDMODFORPILOTSCALEINCINERATOR	APR73/APR73MAY76/MAY76		E
411473,75,76	ANAL*EVALOFFLUTOPILOTSCALEINCINERATOR	JUN76/JUN76JUL77/JUN77		E
411473,74,75	MEROCOCOSTANAL	JAN74/JAN74OCT75/MAY78		E
411473	ANALSTUDY	SEP72/SEP72NOV72/NOV72		E
411473	BENCH*INTERMEDSCALEDEMO	DEC72/DEC72JUL73/JAN74		E
411473	FINALRPT	AUG73/FEB74SEP73/MAY74		E
411473	PROGFUND(RAAP)	NOV72/NOV72NOV72/AUG73		E
411473	BENCH-SCALETEST	DEC72/AUG73JUN73/APR74		E
411473	FINALRPT	JUN74/JUN74JUL74/AUG74		E
411473	PROGFUND(VAAP)	NOV72/NOV72NOV72/JAN73		E
411473	PHASEILABSTUDIFS	JAN73/JAN73MAY73/MAY73		E
411473	PHASEIIXPERCONTRIBSTUDYFURNACEMOD	JUN73/JUN73SEP73/NOV73		E
411473	PILOTPLANTTEST*EVAL	OCT73/DEC73NOV73/JAN74		E
411473	FINALRPT	NOV73/FEB74DEC73/MAR74		E
411473	OPTPILOTOPER*SELPROTO	JUN72/ MAR73/	(DEL)	E
411473,74	ON-LINEDEMO	APR73/ DEC74/	(DEL)	E
411473	BENCHSCALESTUDIES(REUSESCRAPPROP)	JUN73/JUN73JAN74/JAN74		E
411473	LABSTUDY(BAAP)	JUN73/JUN73AUG73/AUG73		E
411473	PRELIMRPT	AUG73/SEP73SEP73/NOV73		E
411473	DETSPEC SOURCES OF BENZENE*ETHYLACE(BAP)	JUL73/JUL73MAY74/MAY74		E
411473	PROCBENCHSCALEFQUIP	NOV73/NOV73MAY74/MAY74		E
411473	EVAL EQUIP	FEB74/FEB74JUL74/JUL74		E
411473	EVALPOTENTIALDOFEIIMSOLVENTS	JUN74/JUN74OCT74/OCT74		E
411473	FINALRPT	SEP74/SEP74JUN75/JUN75		E
411473	INTERIMRPTFORE*PROGSTUDYATHAAP	MAY73/MAY73JAN74/JAN74		E
411473	IDENTOF SPLINSTOINEEDS	JUL73/JUL73JUN74/JUN74(ADD)		E
411473	DEVOFENGHTCSLURRYMONITOR(OPTICPROBE)	DEC72/DEC72JUL73/JUL73(ADD)		E
411473	OPTICPROBELAB*PILOTSCALE	DEC72/DEC72DEC73/DEC73(ADD)		E
411473	EVALOFANBAIRMONITOR	AUG72/AUG72JUL73/JUL73(ADD)		E
411473	EVALOFNOXSOURCEMONITORS	SEP72/SEP72AUG73/AUG73(ADD)		E
411473	EVALOFWATERMONITORSYSTS	JUN73/JUN73MAY74/MAY74(ADD)		E
411473	DEVPOLAROGRAPHICTYPEMONITOR(NITRO)	SEP72/SEP72JAN74/JAN74(ADD)		E
411473	FEASSTUDYFORRAMSPECTRO(TETRANITRO)	JUN73/JUN73SEP73/SEP73(ADD)		E
411473	FEASSTUDYFORCOLORIMETRY	JUN73/MAY73SEP73/DEC73(ADD)		E
411473	DEVPLEZOELECTTYPEMONITOR	SEP72/SEP72SEP74/SEP74(ADD)		E
411473	DEVINFRAKEDTYPEMONIT(METHYLNITRATE)	FEB73/FEB73JAN74/JAN74(ADD)		E
411473	EVALOFFINKWATERMONITOR	APR73/APR73DEC73/DEC73(ADD)		E
411473	INTERIMRPTS	JUN73/JUN73MAY74/MAY74(ADD)		E
411473	BKGNDCQUIS	JUL72/JUL72JUN73/JUN73		E
411473	PRELIMDSGNFORIMITYTESTSYST	APR73/ SEP73/		E
411473,74	BENCHSCALETESTOFFROMISAPPROACHES	JUL73/MAR73JUN74/		E
411473	SURVEYSPLANNED(AIRSURVEY)	SEP72/MAY72DEC72/DEC72		E
411473,74	SURVEYCOND	NOV72/NOV72JUN74/JUN74		E
411473,74	FEASSTUDYNPOSEPCESS(WATERBASELUBES)	MAY73/MAY73JUL73/JUL73		E
411473	ACGPERS	DEC72/DEC72JUN73/JUN73		E
411473	PROCEQUIP	DEC72/DEC72JUN73/JUN73		E
411473	ENVIRASSESS	DEC72/JAN73MAY73/JUN73		E
411473	QUARTERLYSURVEY	JAN73/JAN73JAN73/APR73		E
411473	ANNUALPROGRPT	JUN73/JUN73JUN74/DEC74		E
411474,75	POLYUTEREMOFRRFPLANTS*FINALENGRRPT	SEP74/SEP74DEC76/DEC76		E
411474	OPEN*EVALEQUIP	DEC73/AUG74MAR74/JAN75		E
411474	INTERIMRPT	MAR74/APR75MAY75/MAY75		E
411474	FINALRPT	JAN74/JAN74APR74/FEB75		E
411474,75	HYBRIDEMMISSIONSTUDIES	NOV75/ FEB77/		E
411474	EQUIPMUD(VAAP)	MAY74/MAY74JUL74/JUL74		E
411474	FURNACEEVALTESTS	JUL74/JUL74AUG74/AUG74		E
411474	FINALRPT	SEP74/OCT74OCT74/NOV74		E
411474	PILOTPLANTTESTPLAN(RAAP,MEROC)	FEB74/FEB74APR74/MAR74		E
411474,75	PILOTPLANTINSTALL*EVAL	APR74/APR74OCT75/OCT75		E
411474	PILOTPLANTINSTALL*EVAL	SEP73/SEP73OCT75/OCT75		E
411474	EQUIPPHOC(PHASEII)	SEP73/SEP73OCT73/OCT73		E
411474	EQUIPDEL	OCT73/OCT73NOV73/NOV73		E
411474	EQUIPEVAL	NOV73/NOV73JUN74/JUN74		E

411474	FINALRPT	MAR74/MAR74OCT74/OCT74	E
411474,75,76	ACIDWATERRECYFINALRPTUSGN(RAAP)	JUN76/OCT76NOV76/NOV76	E
411474	FINALRPTWATERUYILSTUDY(HAAP=INTERLN)	AUG74/AUG74DEC74/DEC74	E
411474	EVALPILOTPLANT(MODAC2OMFG)	SEP74/FEB75APR76/MAY76	E
411474	FINALRPT	APR76/APR76JUN76/JUN76	E
411474	ECONALOFRECY/REUSEFORHAAPA+BPROC	JAN74/JAN74JAN75/JAN75	E
411474	IDENTOF SPLINSTONEEDS	JUL74/JUL74JUN75/JUN75(ADD)	E
411474	RPT	AUG73/AUG73OCT73/OCT73(ADD)	E
411474	DEVOLTHAVYULETYYPEMONITOR(MONONITRO)	FEB73/FEB73JAN74/JAN74(ADD)	E
411474	RPT	JAN74/JAN74JUN75/JUN75(ADD)	E
411474	OPTICPROBELAB+PILOTSSCALE	JAN74/JAN74DEC74/DEC74(ADD)	E
411474	OPTICPROBELAB+PILOTSSCALE	JAN75/JAN75DEC75/NOV75(ADD)	E
411474	EVALOFNOXSOURCEMONITORS	SEP73/SEP73AUG74/AUG74(ADD)	E
411474	RPT	FEB74/FEB74MAY74/MAY74(ADD)	E
411474	EVALPOLAROGRAPHICTYPEMONITOR	FEB74/FEB74JUL76/AUG76(ADD)	E
411474	RPT	OCT73/OCT73JAN74/JAN74(ADD)	E
411474	RPT	OCT73/JAN74MAR74/MAR74(ADD)	E
411474	RPT	JUL74/JUL74OCT74/OCT74(ADD)	E
411474	RPT	JAN74/JAN74JUN75/JAN75(ADD)	E
411474	EVALINFRAREOTYPEMONIT	FEB73/FEB74JUN75/JUN75(ADD)	E
411474	DEVOPRAMANTYPEMONITOR(RDX/MMX)	DEC73/DEC73JUN77/JUN77(ADD)	E
411474	EVALOFWATERMONITORSYSTS(EVALMONITINS)	JUN74/JUN74FEB75/FEB75(ADD)	E
411474	INTERIMRPTS	JUN74/JUN74MAY75/MAY75(ADD)	E
411474	CNTLSYSTDSGN(CNTFGFORNITROCELLULOSE)	JUL73/JUL73DEC73/DEC73(ADD)	E
411474	INSTALLCNTLSYST	JUN74/MAY74DEC74/NOV74(ADD)	E
411474	INSTALLCNTLSYST	JUL74/MAY74SEP74/SEP74(ADD)	E
411474	INITTESTUNDERPLANTCONDITIONS	OCT73/ SEP74/	E
411474	PILOTFACDSGN	JUN74/ DEC74/	E
411474,75	EVALOFRESULTS+RPT	NOV74/NOV74APR75/APR75(ADD)	E
411474	RESURVEYPLANNED	APR74/APR74OCT74/OCT74	E
411474,75	ACHARPTS	OCT73/OCT73DEC74/DEC74	E
411474	DATAEVAL	DEC73/DEC73MAR74/MAR74	E
411474,THMU77	COCROW/MOD/EXPPROGS	DEC73/DEC73SEP77/SEP77	E
411474	FEASSTUDYCABBAGE+PIERCE	MAR74/MAR74MAY74/MAY74	E
411474	FUNDRECD	JUL73/SEP73JUL73/SEP73	E
411474	FISCALBLIG	JUL73/SEP73JUL73/SEP73	E
411474	LITSEARCH	JUL73/JUL73SEP73/SEP73	E
411474	AUTOEQUIPSTUDYFORWATERANAL(WATENINST)	OCT73/OCT73FEB74/FEB74	E
411474	PUROFWATERANALFQUIP	FEB74/FEB74JUN74/JUN74	E
411474	AUTOEQUIPSTUDYFORAIRANAL(AIRINSTRU)	APR74/APR74AUG74/AUG74	E
411474	ANNUALPROGRPT	JUN74/JUN74JUL74/JUL74	E
411475	BENCHSCALE SUPPORTSTUDIES(RAAP)	APR76/APR76AUG76/NOV77	E
411475	PROCEVAL+PILOTPLANTSEL	OCT74/OCT74MAY75/MAY75	E
411475	PROSPOND(VAAP)	MAY75/MAY75JUN75/JUN75	E
411475	IDENTOF SMELT IMPURITIES(B+W)	SEP75/NOV75DEC75/DEC75	E
411475	EVALOFREMOVALTECH(H+W)	DEC75/JUN76DEC76/DEC76	E
411475	SSRP(VAAP)	FEB77/FEB77JUN77/JUN77	E
411475	ASSESS+RPT	NOV77/NOV77MAR78/APR78	E
411475	AIRRECOVERYSTUDIES	JAN78/JAN78MAR78/MAR78	E
411475,76	SSRP(VAAP,RAAP)	SEP77/NOV77OCT79/OCT79	E
411475	RPT	MAR74/MAR74JAN77/JAN77	E
411475	DEFPROGPLANS+ORJ(HAAP)	JUN76/JUN76SEP76/SEP76	E
411475	BENCHSCALEEVAL	SEP76/SEP76FEB77/FEB77	E
411475	EQUIPEVAL	DEC76/DEC76APR77/APR77	E
411475	PILOTPLANTDSGN	APR77/APR77JUN77/JUL77(ADD)	E
411475,76	PILOTPLANTINSTALL+EVAL	OCT77/NOV77DEC79/ (ADD)	E
411475	DEVTCHFORREC+RECYOFETHACE+NITRO(P)	MAR75/MAR75MAY75/JUL75	E
411475	BENCHSCALEEVALOFBESTMTHD+EQUIP	MAR75/MAR75MAY75/JUL75	E
411475	FINALRPT	FEB76/FEB76OCT76/OCT76	E
411475	ORDEQUIP,CHPLODADSGNPLOT(VAAP-SAR)	FEB75/FEB75JUN75/ (DEL)	E
411475	CONST+EVALOFPILOTEQUIP	JUL75/ NOV75/ (DEL)	E
411475	FINALRPT	NOV75/ DEC75/ (DEL)	E
411475	VAAPSEGCODL+PRNCRECECUANALFINRPT(EWA)	JUN75/JUN75DEC76/MAR77(ADD)	E
411475	IAAPMAAPLPOPEPI+IIFINALRPTS	APR75/APR75JAN77/FEB77(ADD)	E
411475	BENCHSCALEVALPHIIFINALRPT	APR75/APR75MAY76/MAY77(ADD)	E
411475	IAAPBLACKPOWDR+FGPHIIFINALRPT	APR75/APR75JAN77/FEB77(ADD)	E

411475.76	HAAPPYK0+KISSILECASEPHOPHI+IIFINRPT	FEB75/	JUN75/	(DEL)	E
411475.76	JAAPSELLITEMFROHI+IIFINALRPT	APR75/	AUG75/	(DEL)	E
411475.76	JAAPHFGOFONT+TETRYLPHI+IIFINALRPT	JUN75/	NOV75/	(DEL)	E
411475.76	HAAPSECCOOL+PROCWATERSURFINALRPT	AUG75/	JAN76/	(DEL)	E
411475.76	SFEWATERHGTTASKASSGN	FEB75/FEB75	SEP77/SEP77		E
411475	USGN(NITROCNLSYST)	MAR75/MAR75	JUN75/MAR76	(ADD)	E
411475	PRCL+INSTALL	AUG75/JAN76	SEP76/AUG77	(ADD)	E
411475	EVAL	SEP77/SEP77	MAY79/MAY79	(ADD)	E
411475	RPT	JAN78/JUN79	MAY78/DEC79	(ADD)	E
411475	USGN(TECHANITROMETHANECNLSYST)	JUL75/JUL75	JAN76/JAN76	(ADD)	E
411475	PRCL+INSTALL	FEB76/FEB76	DEC76/MAR77	(ADD)	E
411475	RPT	JAN77/JAN77	APR77/JUL77	(ADD)	E
411475	LITSEAMCH(NOXCNLSYST)	MAY75/MAY75	JUL75/JUL75	(ADD)	E
411475	USGN	SEP75/SEP75	DEC75/APR78	(ADD)	E
411475	PRCL	JAN76/JAN76	DEC77/APR78	(ADD)	E
411475	INSTALL	JAN78/JAN78	JAN80/	(ADD)	E
411475	HAZARDSANAL+ONLINEEVAL	MAY80/	JUL80/	(ADD)	E
411475	RPT	AUG80/	OCT80/	(ADD)	E
411475	IDENTOFSPLINST+UNEEDS	JUL75/JUL75	OCT77/	(DEL)	E
411475	EVALUOFULTRAVIOLETTYPEMONITOR	FEB74/FEB74	JUN75/JUN75	(ADD)	E
411475	EVALOFAIRMONITOR	AUG74/AUG74	JUN75/JUN75	(ADD)	E
411475	EVALUOFNOXSOURCEMONITORS	SEP74/SEP74	NOV75/MAY76	(ADD)	E
411475	RPT	AUG76/AUG76	NOV76/OCT76	(ADD)	E
411475	EKTIPULATUGRAPHICPRINCIPLE	NOV75/NOV75	DEC76/DEC76	(ADD)	E
411475	EVALOFPICZUELFCTTYPEMONITOR	OCT74/OCT74	APR77/APR77	(ADD)	E
411475	RPT	JUL75/NOV77	OCT75/DEC77	(ADD)	E
411475	RPT	MAY75/MAY75	AUG75/AUG75	(ADD)	E
411475	RPT	JUL77/	SEP77/	(DEL)	E
411475	EVALUOFMANTYPEMONITOR	OCT77/	MAR78/	(DEL)	E
411475	RPT	APR78/	JUN78/	(DEL)	E
411475	EVALOFAIRMONITORSYSTS	MAR75/MAR75	DEC75/MAY76	(ADD)	E
411475	EVALUOFACIDMISTMONITOR	MAR75/MAR75	DEC75/APR76	(ADD)	E
411475	INTERIMRPTS	JUN75/JUN75	DEC75/DEC75	(ADD)	E
411475	EVALCNLSYST	DEC74/DEC74	JUL75/JUL75	(ADD)	E
411475	RPT	AUG75/AUG75	OCT75/OCT75	(ADD)	E
411475	USGNSLURRYCNLSYST(EXPL+PROPWASTEINC)	SEP74/SEP74	DEC74/DEC74	(ADD)	E
411475	EVALSLURRYCNLSYST	JUL75/JUL75	DEC75/NOV75	(ADD)	E
411475	RPT	JAN76/JAN76	APR76/APR76	(ADD)	E
411475	EVALCNLSYST	OCT74/OCT74	JUN75/JUN75	(ADD)	E
411475	EVALIPKAC	JAN75/	JUN75/		E
411475	PERFORMLOTPLANT+BLDG	JUL75/	JUN76/	(DEL)	E
411475.76	PILOTFACTEST+EVAL	JUL75/	MAR76/		E
411475	RAAPHSURVEY	SEP74/SEP74	OCT74/OCT74		E
411475	AUTOADAPTOFWATERANALEQUIP	JUN74/JUN74	FEB75/FEB75		E
411475	PURCOFAIRANALEQUIP	AUG74/AUG74	DEC74/FEB75		E
411475.76	AUTOADAPTOFAIRANALEQUIP	DEC74/MAR75	OCT75/JAN76		E
411475	FIELD SURVEY(PRA)	SEP74/JUN75	JUN75/		E
411475	ANNUALPROGRPT	JUN75/MAY75	JUL75/JUN75		E
411475	CHTRNEG+AWARD	JAN75/JAN75	MAR75/DEC75		E
411475	REVUTAFKPOLSURVEY	MAR75/MAR75	APR75/APR75		E
411475	SELTECHFORSTUDY+PLANPROG	MAY75/MAY75	JUN75/JUN75		E
411476	SULFURICACIDSCREVAL	AUG78/	FEB79/	(DEL)	E
411476	NITRICACIDSCREVAL	FEB79/	AUG79/	(DEL)	E
411476	EVALUFEVPROC	MAY80/	FEB80/	(ADD)	F
411476	FINALRPT	MAR80/	JUN80/		E
411476.77	INTERIMRPTONFLIHUEDPILOTSCALEINCR	MAY76/MAY76	MAR77/	(DEL)	E
411476.77	FINALRPT	JAN77/JAN77	JUN77/JUN78		E
411476	RPT+TOP	JUN75/AUG75	JUL76/AUG76		E
411476	EVALUOFERTIARYTREAT	MAR76/MAR76	MAR77/APR77		F
411476	FINALRPT	DEC79/	APR80/	(ADD)	E
411476	PILOTPLANTUSGN+INSTALL(PII)	FEB76/FEB76	OCT76/OCT76		E
411476	PILOTPLANTEVAL	SEP76/SEP76	MAR76/JUN76		E
411476	PROCSYSTUSGN+INSTALL	OCT76/OCT76	JUL77/		E
411476	FINALRPT	JUN77/JUN77	APR79/APR79		E
411476	REV+PUBOFFINALRPT	MAY79/MAY79	JUL79/SEP79		E
411476	RECPROPSAMPFRAAP(ARMADCOM)	AUG76/AUG76	AUG76/AUG76		E

411476	PERFSMT-TERMSTOR/STABTESTS	SEP76/SEP76JAN77/FEB77	E
411476	PERLONG-TERMSTOR/STABTESTS	SEP76/SEP76SEP77/SEP77	E
411476	PREPFINALRPT	SEP77/SEP77AUG78/AUG78	E
411476.77	INFL-EFFLWATERQUALQUANT(CSL/ARRADCOM)	OCT77/OCT77JAN78/JAN78	E
411476.77	EVALDATA	FEB78/FEB78MAY78/MAY78	E
411476.77	FINALRPTRECOMFORRECY/REUSE	JUN78/JUN78JUL79/AUG79	E
411476.77	FINALRPTRECOMFORRECY/REUSE(DSN)	JUN78/JUN78JUL78/AUG78	E
411476.77	FINALRPTRECOMFORRECY/REUSE(NGU)	JUN78/JUN78OCT78/AUG79	E
411476	RPT	JAN77/JAN77SEP77/SEP77(ADD)	E
411476	EVALOFWATERMONITORSYSTS	JUN76/JUN76JUL77/JUL77(ADD)	E
411476	EVALOF SULFIDE MONITOR	MAR76/MAR76JAN80/ (ADD)	E
411476	EVALOF TOT CARBON MONITOR	MAR76/MAR76JAN80/ (ADD)	E
411476	EVALOF NITRO MONITOR(AIR)	JAN76/JAN76MAR80/ (ADD)	E
411476	EVALOF HYDROCARBON MONITOR	JUN76/JUN76DEC76/JUN78(ADD)	E
411476	INTERIM RPTS	JAN76/JAN76JUL77/JUL77(ADD)	E
411476	FINALRPT	APR76/ MAY76/	E
411476	ASSY OF PILOT-EQUIP BLDG	JAN76/ APR76/ (DEL)	E
411476	IDENT-EVAL OF TNY COMPOST PROD	MAR76/ NOV76/ (DEL)	E
411476	INSTALL COMPOST EQUIP(PHASE I)	MAY77/MAY77JUN77/JUL77(ADD)	E
411476	ESTABACT COMPOST	MAR78/MAR78JUL78/AUG78(ADD)	E
411476	ANAL SAMPLES	JUL78/NOV78SEP78/FEB79(ADD)	E
411476	REPEAT COMPOST	MAR79/MAR79APR79/APR79(ADD)	E
411476	REPEAT ANAL	APR79/APR79JUN79/JUN79(ADD)	E
411476	FINALRPT	JUN79/JUN79SEP79/SEP79	E
411476	TOXICITY STUDIES(PHASE II)	MAY79/MAY79APR80/	E
411476	LCAAP RESURVEY	JUL75/JUL75AUG75/AUG75	E
411476	ONSITE INSTALL-TEST EQUIP WATER	FEB75/JUL75APR77/APR77	E
411476	FINALRPT WATER	APR77/APR77MAY77/JUL77	E
411476	ONSITE INSTALL-TEST EQUIP-AIR	OCT75/JUL75MAR79/MAR79	E
411476	FINALRPT-AIR	MAR79/MAR79APR79/MAY79	E
411476	FINALRPT-PROG	APR79/MAY79MAY79/MAY79	E
411476	SAAP(FIELD SURVEY)	AUG75/AUG75SEP75/SEP75	E
411476	PBA	OCT75/OCT75NOV75/NOV75	E
411476	PBA	MAY76/MAY76MAY76/MAY76	E
411476	SAAP-PES	MAR75/MAR75AUG75/MAR76	E
411476	RAAP-PES	AUG74/SEP74SEP75/JAN76	E
411476	PBA-SUMOPTIC	JUL75/AUG75MAR76/APR76	E
411476	PBA-P4	JAN76/JAN76NOV76/MAR77	E
411476	SAAP-BENTHOS	JAN76/JAN76OCT78/AUG77	E
411476	MAAP-PES	MAR76/JAN76DEC76/JUL77	E
411476	VAAP-PES	MAR76/JAN76DEC76/AUG77	E
411476	RMA-BIOL	JAN76/JAN76SEP76/JUL77	E
411476	DPC-BIOL	JAN76/JAN76SEP76/AUG77	E
411476	PRO-EQUIP CONS+INSTALL	DEC75/DEC75AUG76/DEC76	E
411476	DEVENG DATA	MAY75/MAY75SEP75/SEP75	E
411476	PRELIM STDY-EVAL SEL TECH	DEC75/DEC75JAN76/JAN76	E
411476	PILOT STDY	FEB76/MAR76MAY77/DEC77	E
411477	FINAL TASK RPT	JAN80/ MAR80/ (ADD)	E
411477	ANAL FOR WAX CONT PRIOR TO FILTER(KAAP)	MAY77/MAY77JUL77/JUL77	E
411477	WATER BALVS PROC-PROD	MAY77/MAY77NOV77/NOV77	E
411477	COLD STEAM COND FORMELT KETTLE+ANAL	AUG77/AUG77AUG77/AUG77(ADD)	E
411477	PROP WAX REM THD PRIOR TO FILTER STEP	AUG77/AUG77OCT78/OCT78	E
411477	DEF STEAM COND+RFC REUSE	NOV77/ JAN78/	E
411477	FINAL RPT	OCT78/OCT78DEC78/DEC78	E
411477	EVAL REUSE OF STEAM COND	JUL78/JUL78AUG78/AUG78(ADD)	E
411477	EVAL REUSE OF TREATED WATER	JUL78/JUL78OCT78/OCT78(ADD)	E
411477	CALC WATER BALVS WATER QUAL REL TO USE(10AP)	MAY77/MAY77JUL77/JUL77	E
411477	IDENT RECY/REUSE MEAS	JUL77/JUL77SEP77/SEP77	E
411477	FINAL RPT DWS RECOM	OCT77/OCT77NOV77/MAY78	E
411477	COMP-EVAL PILOT PLANT THDS FOR NITROREM	APR77/APR77JUN78/JUN78	E
411477	PERE CO ANAL ON ESTAB+PROP THDS	JUN77/JUN77JUN78/FEB79	E
411477	FINAL RPT	JUN78/SEP78JUL79/AUG79	E
411477	SAAP RESURVEY	OCT76/OCT76NOV76/FEB76	E
411477	AIR PERMIT(MAAP)	FEB78/FEB78SEP78/SEP78	E
411477	WATER PERMIT	APR78/APR78APR79/OCT78	E
411477	SOLID WASTE PERMIT	JUN78/JUN78JUN79/JUN79	E

411477	PBA (FIELD SURVEY)	MAR77/APR77APR77/MAY77	E
411477	PBA-PRODAREACREEK (SURVEYRPTS)	SEP77/NOV77JAN78/JAN78	E
411477	PHASE I PROGRPT	NOV76/DEC76SEP77/NOV77	E
411477	EXP CAP TEST EFFLIENTS	JUL77/OCT77DEC77/DEC77	E
411477	REVDATA+DEVPRG	JAN77/JUL77HAR77/DEC77	E
411477	IMPLPRG	SEP77/AUG78DEC79/	E
411478	FINALRPT	JUN79/	E
411478	TOAU (FIELD SURVEY)	MAY78/MAY78JUN78/JUN78	E
411478	AAD	MAY78/MAY78AUG78/AUG78	E
411478	TOAD (SURVEYRPTS)	JUL78/JUL78DEC78/DEC78	E
411478	AAP	SEP78/SEP78DEC78/DEC78	E
411478	PHASE II PROGRPT	JAN78/JAN78FEB78/MAR78	E
411478	SHAKEDOWN ONLY TEST PHASE III	MAR78/MAY78FEB79/FEB79	E
411478	PHASE III	NOV78/NOV78FEB79/FEB79	E
412479	MASTER PLAN REVITFW	DEC79/FEB80DEC79/FEB80	M
412479	PROCESS MACHENG STUDIES	FEB80/DEC79JUL80/	M
412479	PRELIM CYCLE STUDIES	APR80/APR80AUG80/	M
412479	FINAL PROCESS	MAR80/ APR80/	M
412479	TOOL FIXTURES PFC	JUN80/ SEP80/	M
412479	PROGRAMMING	SEP80/ NOV80/	M
412479	FINAL PRG DESIGN	OCT80/ SEP80/	M
412479	TOOL FIXTURE PURCHASE (BUILD)	NOV80/ MAY81/	M
412479	INSTALL TRYOUT	JUN81/ JUL81/	M
412479	RUNOFF (200) PCSTOTAL (5 * 8)	SEP80/ SEP80/	M
412479	FINALIZED DATA PKG	JUN81/ JUN81/	M
412479	SUBMIT FINAL RPT TO DATA PKG+TOOLS+FIXTURES	OCT80/ OCT80/	M
412479	SUMOFF PROCOPT	MAY80/ SEP80/	M
412479	RUNOFF 100 PCS	JUN81/ JUL81/	M
412479	FINAL RPT	JUL81/ SEP81/	M
413779	RELEASE PROGRAM AUTHORIZATION	OCT78/DEC78OCT78/DEC78	E
413779	REVIEW ESTAB EQUIPOSIGN PARAMETERS	NOV78/DEC78NOV78/JAN79	E
413779	PREPARE SCOPE OF WORK TO DETERMINE FEAS	NOV78/JAN79MAR79/MAR79	E
413779	AWARDFEAS CONTRACT	APR79/APR79JUN79/ (DEL)	E
413779	FEAS STUDY	OCT79/OCT79JUN80/	E
413779	SEL CONCEPTS TO RDEV	OCT79/OCT79DEC79/FEB80 (ADD)	E
413779	DEV CONCEPTS	DEC79/FEB80JAN80/MAR80 (ADD)	E
413779	PRELIM ANALYSIS	JAN80/MAR80MAR80/MAY80 (ADD)	E
413779	FINAL ENG EVAL	JUN80/ JUN80/ (ADD)	E
413779	FINAL TECH RPT	JUN80/ SEP80/ (ADD)	E
413779	FINAL 301 RPT	DEC80/ (ADD)	E
414770	PROJ APPVL	N/A OCT70/OCT70	E
414770	PREP OF RFQ	DEC70/DEC70JAN71/JAN71	E
414770	EVAL OF TECH PROP. SEL	MAR71/MAR71APR71/APR71	E
414770	PLAS CONTRACT	N/A JUL71/JUL71	E
414770	DET DSGN CNLY SYST	(DEL)	E
414770	DSGN+SPEC REV	JUL71/JUL71MAR72/MAR72	E
414770	EQUIPOSIGN+TAB	OCT71/OCT71JUL72/JUL72 (ADD)	E
414770	FLOWCHART+DET SOFTWARE DSGN+CODING	OCT71/OCT71NOV72/JAN73 (ADD)	E
414770	INSTALL FIELD EQUIP	AUG72/AUG72NOV72/JUN73	E
414770	FACT TEST COMP PHDR+SOFTWARE	JUL72/AUG72NOV72/JUN73	E
414770	SHPMTCOMPTOVAAP	DEC72/JUL73DEC72/JUL73	E
414770	INSTALL COMP IN CNL HOUSE	JAN73/JUL73MAR73/AUG73	E
414770	CNTLSYSTONSITE CHECKOUT EVAL	FEB73/AUG73SEP73/NOV78	E
414770	FINAL PROJ RPT	SEP73/FEB75OCT73/JUN79	E
414774	VAAPI INSECTSYNDV+SUPCNTLSFTWIMPLE	JUN74/ AUG74/ (DEL)	E
414774	SUPCNTLSFTWIMPLE	JAN74/ JUN74/ (DEL)	E
414774	PREPRAPSYSTSPFC	JAN74/MAY74APR75/MAR76 (DEL)	E
414774	EVAL OF PROP+VENOSEL	JUL74/JUN75AUG74/ (DEL)	E
414774	PREP+ISSINVFORDONANALOGSYST	APR76/APR76JUN76/AUG76 (ADD)	E
414774	EVALBIOS+VENOSEL FOR ANALOGSYST	OCT76/OCT76NOV76/JAN77 (ADD)	E
414774	CNTRNED+AWARD	FEB77/FEB77APR77/JUL77 (ADD)	E
414774	MDWRDSGN+TAB	SEP74/AUG77OCT75/NOV78	E
414774	SOFTWARE DSGN+PROG	SEP74/ OCT75/ (DEL)	E
414774	INSTALL ANALOG EQUIP+PRESTARTUP CHECKOUT	JUL75/AUG79OCT75/MAY80	E
414774	OPER+EVAL OF CLT NEUNDER CNL OF ANALOGSYNOV75/	JAN76/	E
414774	PRESHPMT CHECKOUT OF DIGITAL SYST	AUG75/ NOV75/ (DEL)	E

414774	SHPMTOFDIGSYSTORAAP	DEC75/	DEC75/	(DEL) E
414774	INSTALLDIGEQUIP+CHKOUTOFINTEGSSYST	JAN76/	FEB76/	(DEL) E
414774	DOACSYSTPEREVAL	MAR76/	MAY76/	(DEL) E
414774	SUP SOFTWARE IMPL	JUN74/	JUN74/	(DEL) E
414774	PREPFINALRPT	JAN76/	JUN76/	(DEL) E
414774	PRE-START-UP CHECK-OUT	APR80/APR80	AUG80/	(ADD) E
414774	FINALTECHRPT	AUG80/	NOV80/	(ADD) E
414774	FY74FISCALFINAL301RPT	DEC80/	DEC80/	(ADD) E
414774	OVERALLPROJFINAL301RPT	DEC80/	DEC80/	(ADD) E
415378	RECEIPTOFFUNDS	MAY78/MAY78	MAY78/MAY78	M
415378	AWARDOFCONTRACT	JUL78/MAY78	SEP78/FEB79	M
415378	CORRULIRASONICDATA	OCT78/MAR79	JAN79/AUG79	M
415378	ESTABPROD	JUN79/	AUG79/	M
415378	CLEANPROC	AUG79/AUG79	JAN80/	M
415378	BAND15MMH483PROJ	JUL80/	JUL80/	M
415378	BAND8INXMS09PROJ	AUG80/	SEP80/	M
415378	BALISTICEVAL	MAR80/MAY80	SEP80/	M
415378	FINALRPT	SEP80/	NOV80/	M
415378	FINALRPT301	OCT80/	OCT80/	M
416378	ENGRREVIEW+ANALYSIS	APR78/APR78	OCT78/OCT78	E
416378	PREPARESCOPEOFWORK	MAR78/MAR78	MAR78/MAR78	E
416378	REVIEWSCOPEOFWORK(IAAP)	APR78/APR78	APR78/APR78	E
416378	DESIGNTESTPLAN	APR78/APR78	APR78/APR78	E
416378	APPROVESCOPEOFWORK+TESTPLAN	APR78/APR78	APR78/APR78	E
416378	ALLOCATIONOFFUNDS	MAY78/MAY78	MAY78/MAY78	E
416378	DSGN+FABEQUIP	JUN78/JUL78	AUG78/AUG78	E
416378	EXECUTIONOFTESTPLAN	AUG78/SEP78	JAN79/FEB79	E
416378	REVIEWOFTESTRESULTS	SEP78/SEP78	JAN79/FEB79	E
416378	PROCESS+EQUIPDSGNS	SEP78/SEP78	APR79/APR79	E
416378	STUDYREPORT	NOV78/NOV78	MAY79/MAY79	E
416379	ESTABENGRAPPROACH	NOV78/MAR79	NOV78/MAR79	E
416379	DSGNTESTPLN	DEC78/MAR79	DEC78/APR79	E
416379	DSGN+FABOFEQUIP	DEC78/APR79	APR79/MAY79	E
416379	INSIALLOFEQUIP	APR79/MAY79	MAY79/MAY79	E
416379	EXECUTIONOFTESTPLN	JUN79/JUN79	AUG79/NOV79	E
416379	FIRINGTEST (PROVGRD)	AUG79/DEC79	SEP79/MAR80	E
416379	PRODPRCDSGNS	NOV79/NOV79	SEP79/DEC79	E
416379	FINALRPTARRADCOM	DEC79/JAN80	SEP80/	E
416379	FINAL301RPT		SEP80/	(ADD) E
418979	RECEIPTFUNDS	AUG79/AUG79	AUG79/AUG79	M
418979	AWARDOFCONTRACT	APR79/APR79	SEP79/SEP79	M
418979	PURCHASESTEEL	OCT79/OCT79	FEB80/MAR80	M
418979	CHARSTEEL	FEB80/FEB80	JUN80/	M
418979	FINALRPT	JUL80/	AUG80/	M
418980	RECEIPT FUNDS	NOV79/NOV79	NOV79/NOV79	(ADD) M
418980	AWARD OF CONTRACT	NOV79/NOV79	JUL80/	M
418980	PROCOPT	JUL80/	FEB81/	M
418980	OPTFORGINGPRESS	APR80/	JUL80/	(ADD) M
418980	EVALMULTIPARTING	JUL80/	SEP80/	(ADD) M
418980	DETNEEDFORSPHEROIDIZEANNEAL	SEP80/	NOV80/	(ADD) M
418980	EVALMACHINE TOOLS	OCT80/	DEC80/	(ADD) M
418980	FINAL REPORT	MAR81/	APR81/	(ADD) M
418980	FINALRPT301	APR81/	APR81/	(ADD) M
419479	FISCAL OBLIGATION	MAY79/MAY79	JUL79/JUL79	M
419479	PRELIMSTDY	JUN79/JUN79	SEP79/SEP79	M
4194	PRCC/FABOFTSTEQUIP	DEC79/AUG79	OCT80/	M
419479	STDYPRCCSAEQUIPPARMETERS	DEC79/DEC79	JAN81/	M
419479	HAZARDANAL	SEP79/	NOV80/	M
419479	PERFTECHAECONANAL	NOV80/	JAN81/	M
419479	PREPRTPAKERECOMM	JAN81/	MAY81/	M
420080	PRCTUSWCOMPL	NOV80/NOV80	MAR80/MAR80	E
420080	SYSEVAL	JAN80/JAN80	SEP80/	E
420080	FINAL301RPT	SEP80/	FEB81/	E
420270	LABSTUDY	DEC70/DEC70	APR71/JUN74	E
420270	PROCTINSTALLBENCHSCALEEQUIP	MAR71/MAR71	JUN71/JUN71	E
420271	LABSTUDY	DEC70/DEC70	AUG71/AUG71	E

420271	PROC+INSTALLBENCHSCALEEQUIP	MAR71/MAR71SEP71/JAN72	E
420271	PERBENCHSCALESTUDY+COMPILEDATA	JUN71/JUN71JUL72/JUL72	E
420271	SELPROC	JUN71/JUN71NOV71/NOV71	E
420271	ESTABPILOTLINEsGN	NOV71/OCT71DEC71/DEC71	E
420272	MODBLDGFORPILOTLINE	JAN72/DEC71JUN72/JUN72	E
420272	PROC+INSTALLPILOTLINEEQUIP	JAN72/JAN73SEP72/OCT73	E
420272	PERPILOTSCALESTUDY+COMPILEDATA	OCT72/OCT72JUN73/OCT73	E
420272	ESTABFACDSGNCRITERIAFORCORPSOFENGRS	MAR73/JAN73JUN73/OCT73	E
420272	MODBLDGFOR THERMALDEHY	JAN73/JAN73JUN73/JUN73	E
420273	PROC+INSTALL THERMALDEHY	JAN73/JAN73SEP73/SEP75	E
420273	PROC+INSTALLPILOTLINEEQUIP	JAN72/JAN72JUL74/JUL74	E
420273	PERPILOTSCALESTUDY	OCT72/OCT72JUL74/MAR75	E
420273	ESTABFACDSGNCRITERIAFORCORPSOFENGRS	MAR73/JAN73AUG74/DEC74	E
420273	INITIATEFINALRPT	MAR74/JUN74MAR75/MAR75	E
420273THRU75	PROC+INSTALLSF6SCREWS	MAY75/MAY75AUG75/AUG75	E
420273THRU75	PERDSGNIMPVTENGR	JUN75/JUN75MAR76/JUN76	E
420273THRU75	PERPILOTSCALESTUDY+COMPILEDATA	JUL75/JUL75DEC75/APR76	E
420275	MFGPILOTLOTSFORBALLISTICTEST	NOV75/MAR76DEC75/APR76	E
420275	CONDUCTBALLISTICTEST	DEC75/JUN76JUN76/JUN76	E
420276	PERDSGNIMPVTENGR	MAY76/JUN76JUN76/JUN76	E
420276	PERPILOTLOTSTDY+COMPILEDATA	MAY76/JUN76DEC76/SEP76	E
420277	PERDSGNIMPVTENGR	SEP76/SEP76FEB77/FEB77	E
420277	PERH30A1PROCDEV	JAN77/FEB77JUN77/JUN77	E
420277	PERPILOTSCALESTUDY+COMPILEDATA	SEP76/SEP76JUN77/ (DEL) E	
420277	MFGH30A1PILOTLOT	JUN77/ JUN77/ (DEL) E	
420277	CONDUCTBALLISTICTESTOFM30A1	JUL77/ SEP77/ (DEL) E	
420277	MFGH26E1PILOTLOTFORBALLISTICTEST	OCT76/ DEC76/ (DEL) E	
420277	CONDUCTBALLISTICTESTOFM26E1	JAN77/ MAR77/ (DEL) E	
420277	PILOTLINESCALESTDY+COMPILEDATA	SEP76/SEP76DEC77/JAN78	E
420277	MFGH30A1PILOTLOT	JUN77/JUN77AUG77/AUG77	E
420277	CONDUCTBALLISTICTESTOFM30A1	SEP77/SEP77DEC77/SEP78	E
420277	COMPLPROCFORM26E1+CONDLABTEST	SEP77/SEP77NOV77/JUN78	E
420277	PREPFINALTECHRPT	SEP77/SEP77APR80/	E
420277	FINAL301RPT	MAY80/MAY80JUN80/JUN80	E
421080	FUNDINGRECVDG000	NOV79/DEC79NOV79/DEC79	E
421080	FUNDINGRECVDG000	SEP80/ SEP80/	E
421080	ENGRSGN	SEP80/ JAN81/	E
421080	BLDGMOD	JAN81/ JUL81/	E
421080	PROC/FABEQUIP	FEB81/ JUL81/	E
421080	INSTALLEQUIP	JUL81/ SEP81/	E
421080	EQUIPDEBUG	SEP81/ DEC81/	E
421080	EVAL/PILOTLOTMFG	DEC81/ MAR82/	E
421080	HAZARDOUSANALYSIS	SEP80/ MAR82/	E
421080	PILOTLOTTEST	FEB82/ MAR82/	E
421080	FINALRPT	MAR82/ MAY82/	E
421176	COMP+EVALDATA CONCEPTTECHAUTOCNT (TASK I)	SEP75/SEP75DEC75/MAR76	E
421176.77	DEVSGNCRIT+PRFPSCOPEFORPROCPROTOSYST	JAN76/JAN76JUN76/OCT76	E
421176.77	PROCPROTOCNTLSYST	JUN76/JUL76MAR79/MAR79	E
421177	INSTALLPROTOCNTLSYSTFOREVAL	DEC78/DEC78JUN80/	E
421177	COMPL+EVALDATAFROMLINEPROCCNTLOPER	FEB80/MAY80 JUN80/	E
421177	PREPFINALRTP (TASK I)	JUN80/ AUG80/	E
421177	LITSER+REVOPRIORART (TASK II)	SEP78/SEP78SEP78/SEP78	E
421177	EVALTESTMTHDTYPE3+TYPE2IMPACTDEVICE	SEP78/SEP78SEP78/SEP78	E
421177	REPEAT ABOVE W/MODS	SEP78/SEP78OCT78/OCT78	E
421177	CONFIRMULATION+REV	OCT78/OCT78MAR79/APR79	E
421177	SELOF CONTR+AWARD OF CONTRACT	FEB79/FEB79OCT79/ (DEL) E	
421177	DSGN+FAB OF AUTOIMPCT INSTRU	OCT79/ JUN80/ (DEL) E	
421177	COMPTRPROG	OCT79/ JAN81/ (DEL) E	
421177	PRELSAFETYAPPVLOSNGPRIORTOFAB	JAN80/ OCT80/ (DEL) E	
421177	ENGRREVSITEMODQDFORMACHINSTALL	DEC79/ JUN80/	E
421177	FINALSAFETYINSPCTS+APPVL	APR80/ JUN80/ (DEL) E	
421177	PREPSITE+INSTALLAUTOIMPACTMACH	MAY80/ JUL80/ (DEL) E	
421177	EVAL+TESTAUTOIMPACTMACH	AUG80/ FEB81/ (DEL) E	
421177	STAIANALOFDATA	JAN80/ JUL80/	E
421177	WRITE+ISSUEFINALENGRRPT	APR80/ JUL80/	E
421177	PARTS FAB.	NOV79/NOV79JUN80/ (ADD) E	

421177	MACHINE CONSTRUCTION	NOV79/NOV79JUN80/	(ADD) E
421177	MACHINE DEBUG	FEB80/FEB80 JUL80/	(ADD) E
421177	PROGRAM PROCESSOR	NOV79/NOV79JUL80/	(ADD) E
421177	INTERFACE PROCESS W/MACH.	FEB80/FEB80JUL80/	(ADD) E
421177	DEMO TEST SPEC	JUN80/ JUN80/	(ADD) E
421177	DEBUG AUTO SYS	JUN80/ SEP80/	(ADD) E
421177	DEMO TEST	SEP80/ OCT80/	(ADD) E
421177	REPORT	MAR80/ AUG80/	(ADD) E
421177	ENGR DRAWINGS	AUG80/ AUG80/	(ADD) E
421177	DUP FAB	JUN80/ SEP80/	(ADD) E
421177	INSTALL+DEBUG PLANT	OCT80/ OCT80/	(ADD) E
421177	CALIBRATE	OCT80/ NOV80/	(ADD) E
421177	IMPLEMENTATION	DEC80/ DEC80/	(ADD) E
421177	FINAL30IRPT	NOV80/ DEC80/	E
421478,79	ANALPROGABATECHCHOSTUS+OPERSTATUS	OCT77/MAY78SEP79/	E
421478,79	CNDINTOS+MAINLIAISONW/OGAASSESSENVIR	OCT77/MAR78SEP79/	E
421478,79	SUSTECHREQACT	OCT77/MAR78SEP79/	E
421478	ESTABPROCWATERSPECSQUAL+QUANT (RAAP)	MAY78/MAY78JUL78/JUL78	E
421478	QUAL+QUANTPOLLABATEWATERS	AUG78/AUG78SEP78/SEP78	E
421478	EVALPRACTECO+ENGY	OCT78/OCT78JAN79/JAN79	E
421478	DETMINREQDTREAT	FEB79/FEB79MAR79/MAR79	E
421478	FINALRPTRECSCHOPPROPREUSEMEAS	APR79/APR79OCT79/NOV79	E
421478	ESTABPROCWATERSPECSQUAL+QUANT (HAAP)	SEP78/SEP78FEB79/FEB79	E
421478	QUAL+QUANTPOLLABATEWATERS	FEB79/FEB79APR79/APR79	E
421478	EVALPRACTECO+ENGY	MAY79/MAY79 JUL79/JUL79	E
421478	DETMINREQDTREAT	AUG79/AUG79SEP79/NOV79	E
421478	FINALRPTRECSCHOPPROPREUSEMEAS	OCT79/OCT79DEC79/DEC79	E
421478	USGN+ENGRSMALLSCALETESTMODULES	JUN78/ AUG78/	E
421478	PROC+ASSYOFEQUIP	JUL78/ DEC78/	E
421478	PROCEQUIP (PHASE1)	AUG78/AUG78OCT78/FEB79	E
421478	INSTALL+ASSY	NOV78/NOV78APR79/APR79	E
421478	PROCEQUIP (PHASE2)	DEC78/DEC78APR79/	E
421478	PROOFUNDING	OCT77/OCT77MAR78/MAY78	E
421478	ENGRSTUDIES	MAY78/MAY78JUL78/JUL78	E
421478	BENCHSCALEVAL	JUL78/JUL78JAN80/	E
421478	HAZARDSANAL	JUN78/JUN78JAN80/	E
421478	PILOTPLANTINSTALL	JAN80/ JUL80/	E
421479	PROCPLOTPLANTFAC (RAAP)	NOV79/NOV79JAN80/	(ADD) E
421479	INSTALLPILOTPLANTSYST	JAN80/ FEB80/	(ADD) E
421479	PILOTPLANTEVAL	FEB80/ JUL80/	(ADD) E
421479	ECO+ENGYEVAL	JUL80/ AUG80/	(ADD) E
421479	PREPFDATAFORDSONCRIT	JUL80/ SEP80/	(ADD) E
421479	DOC+FINALRPT	AUG80/ NOV80/	(ADD) E
421479	ETABPROCWATERSPECSQUAL+QUANT (KAAP)	AUG79/AUG79DEC79/	(ADD) E
421479	QUAL+QUANTPOLLABATEWATERS	DEC79/ MAR80/	(ADD) E
421479	EVALPRACTECO+ENGY	MAR80/ JUL80/	(ADD) E
421479	DETMINREQDTREAT	AUG80/ SEP80/	(ADD) E
421479	FINALRPTRECSCHOPPROPREUSEMEAS	SEP80/ OCT80/	(ADD) E
421479	TEST+EVALSTUDIESANAL+ECOEVALDATA	OCT79/ DEC79/	E
421479	HAZARDANAL	NOV79/ FEB80/	E
421479	FINALRPT	MAR80/ APR80/	E
421479	TEST+EVAL	APR79/MAY79 JUL79/	E
421479	FINALRPT	AUG79/ NOV79/	E
421479	INSTALL+ASSY	MAY79/ JUL79/	E
421479	TEST+EVAL	AUG79/ NOV79/	E
421479	FINALRPT	DEC79/ MAR80/	E
421479	PILOTPLANTEVAL	JAN80/ MAR80/	(ADD) E
421479	DEVUSGNCRIT	APR80/ AUG80/	(ADD) E
421479	FINALRPT	JUN80/ SEP80/	(ADD) E
421479	ENGRREVIEW	SEP79/SEP79NOV79/NOV79	(ADD) E
421479	INVESTIGATESTDYS	NOV79/NOV79JUN80/	(ADD) E
421479	PILOTJOBPREP	JUN80/ AUG80/	(ADD) E
421479	DATAANAL/FINALRPT	JUL80/ SEP80/	(ADD) E
421479	DSGN+PROCACONSTLABEQUIP	AUG79/AUG79JAN80/	(ADD) E
421479	BENCHSCALESTDY	FEB80/ JUL80/	(ADD) E
421479	FINALRPT	AUG80/ SEP80/	(ADD) E

421479	ENGRDSGNSTDY (VAAP)	AUG79/AUG79JAN80/	(ADD)	E
421479	FINALRPT (VAAP)	FEB80/ MAR80/	(ADD)	E
421479	ENGRPREP (BAAP)	AUG79/AUG79SEP79/AUG79	(ADD)	E
421479	LEASINGEQUIP (BAAP)	SEP79/SEP79DEC79/	(ADD)	E
421479	TESTEQUIP (BAAP)	DEC79/ SEP80/	(ADD)	E
421479	FINALRPT (BAAP)	OCT80/ NOV80/	(ADD)	E
421478	CNTRAWARD (PHASE4)	DEC78/DEC78MAY79/MAY79	(ADD)	E
421478	DEVOFANALYST	APR79/APR79MAY79/JUN79	(ADD)	E
421478	INSTALLASSYOFFEQUIP	JUN79/JUN79JUN79/JUN79	(ADD)	E
421478	TESTAEVAL	JUL79/JUL79OCT79/OCT79	(ADD)	E
421478	FINALRPT	OCT79/OCT79DEC79/	(ADD)	E
421573	COMPLAEVALDATA	AUG72/AUG72DEC72/DEC72		E
421573	PROCSYSEVALDATA	DEC72/DEC72JUN73/JUN73		E
421573	PREDSGNCRIT	JAN74/MAY74JUN74/JUN75		E
421574	PROTCNTLSYS	JUN74/JUN74APR76/AUG76		E
421574	PROTCNTLSYSACC	JUN76/JUN77JUN76/NOV79		E
421574	TDPCOMPL	JUN76/JAN79JUL76/JUN80		E
421573,74	PROJPHYSICOMPL	JUN80/JUN80JUN80/JUN80		E
421573,74	PROJFISCALCOMPL	JUN80/JUN80JUN80/JUN80		E
421573,74	PROJCLOSEOUT	JUN80/JUN80JUN80/JUN80		E
422373	PILOTPLANTSCOPFOWORK	OCT72/NOV72NOV72/NOV72		E
422373	PILOTPLANTCONTPAWARD	NOV74/FEB73FEB73/FEB73		E
422373	PILOTDSGN	FEB73/FEB73MAY73/MAY73		E
422373	PILOTFAB	MAY73/MAY73JUN73/JUN73		E
422373	PILOTINSTALL	JUL73/JUL73SEP73/SEP73		E
422373	PILOTACCPD	FEB74/FEB74JUL74/DEC74		E
422373	FINALRPT	SEP74/APR75DEC74/AUG75		E
422374	PROTOPLANTSCOPFOWORK	NOV74/NOV74JAN75/JAN75		E
422374	PROTOPLANTCNTRAWARD	FEB75/FEB75MAY75/FEB76		E
422374	PROTODSGN	JUL75/FEB76OCT75/APR76		E
422374	PROTOFAB	SEP75/MAY76JAN76/AUG76		E
422374	PROTOINSTALL	APR76/AUG76MAY76/SEP76		E
422374	PROTOACCPD	MAY76/JAN79JUL76/FEB79		E
422374	FINALRPT	MAY76/NOV78SEP76/DEC78		E
422374,77	EQUIPMOD	OCT76/DEC76DEC78/JAN79	(ADD)	E
422374,77	PROTOEVAL	AUG77/AUG77FEB79/FEB79	(ADD)	E
422377	PROGAUTHORIZATION	OCT76/DEC76DEC76/FEB77	(ADD)	E
422377	MFG/PROCPROPCOLLOID	DEC76/DEC76JUN77/DEC77		E
422377	CONDUCTEXTRUSTUDIES	JAN77/FEB79JUN77/MAR80		E
422377	FABPROCHGS	JAN79/ FEB79/	(DEL)	E
422377	LOAD-TEST	APR80/ MAY80/	(DEL)	E
422377	ECANAL	FEB79/ MAR80/	(DEL)	E
422377	HAZARDANAL	JAN77/NOV75OCT77/JUN77		E
422377	DWG+RAMDOC	MAR80/MAY80AUG80/		E
422377	FINALRPT	AUG80/ SEP80/		E
422377	FINALECHRPT	SEP77/MAY80SEP80/		E
422377	HAZARDANALSUPPL	MAY80/MAY80SEP80/	(ADD)	E
422579	PROJFUNDING	JAN79/JAN79MAY79/JUL79		E
422579	CRITICALCOMPTSYAEVAL	JUL79/JUL79JUL80/		E
422579	PRELIMHAZARDANAL	JUL79/JUL79JUL80/		E
422579	ADAPTATIONSTUDIES	JUL80/ AUG80/		E
422579	PROJPHYSICALCOMPLETION	JUL80/ AUG80/		E
422579	PROJFISCALCOMPLETION	AUG80/ SEP80/		E
422579	PROJCLOSEOUT	SEP80/ OCT80/		E
422680	PROJFUNDING	APR80/APR80AUG80/		E
422680	CHECKOUTFIELD EQUIPMONTORS	SEP80/ JUN81/		E
422680	ASSESSONLINE MONITORPAR	JUN81/ AUG81/		E
422680	INTERIMRPT	AUG81/ SEP81/		E
422680	PROJPHYSICOMPL	OCT81/ OCT81/		E
422680	PROJFISCALCOMPL	OCT81/ OCT81/		E
422680	PROJCLOSEOUT	NOV81/ NOV81/		E
422872	PROGRAMAUTHORIZATION	AUG71/AUG71		E
422872	AWARDCONTRACT	JAN72/SEP72		E
422872,73	DSGNOFFPROTOTYPE	JAN72/SEP72JUL72/SEP73		E
422874	COMPLETETABASSYOFFPROTOSYST	JUN72/SEP73JUL75/DEC75		E
422874	SHIPMENTTOPA	APR75/APR75AUG75/JAN76		E

422874	PABLDGPREP+MOD	FEB75/FEB75JUL75/SEP75	E
422876	SYSINSTALLATION	MAY75/MAY75SEP75/FEB76	E
422876,77,78	DEBUSEOPERATIONATPA	JUN75/JUN75JUN76/JUN78	E
422877	FINALIZESCOPEOFWORKWRAPPERLINER	FEB77/FEB77APR77/FEB77(DEL)	E
422877	AWAROWRAPPERLINERCONTRACT	MAY77/MAY77JUL77/	(DEL) E
422877	WRAPPERLINERFAR	AUG77/ DEC77/	(DEL) E
422877	FINALIZESCOPEOFWORKISLBSSCALE	FEB77/FEB77MAY77/	(DEL) E
422877	AWARDSCALECONTRACT	JUN77/ SEP77/	(DEL) E
422877	SCALESTSTFAB	OCT77/ MAY78/	(DEL) E
422878	DEMONSTRATEEQUIP	JUL78/JUL78JUN78/JUL78(ADD)	E
422878	SHIPEQUIP	JUL78/JUL78AUG78/OCT78(ADD)	E
423180	PROCPILOTPANTFAC	NOV80/ JAN81/	E
423180	INSTALLPILOTPLANTSYS	JAN81/ FEB81/	E
423180	PILOTPLANTEVAL	FEB81/ JUL81/	E
423180	ECOENERGYEVAL	JUL81/ AUG81/	E
423180	PREPDATAADSGNCRIT	JUL81/ SEP81/	E
423180	DOCAFINALRPT	AUG81/ NOV81/	E
423180	ESTPROCH20SPECS	APR80/APR80OCT80/	E
423180	QUALQUANTPOLLABATEH2O	OCT80/DEC80/	E
423180	EVALPRACTECOENERGY	DEC80/ MAR80/	E
423180	DETMINKEGYTREAT	MAR81/ MAY81/	E
423180	FINALRPT	MAY81/ JUN81/	E
423180	OVERALLPROJ30IFINALRPT	JUN81/ JUL81/	E
423680	RECEPTOFFUNDS	OCT79/JAN80	E
423680	PREPSCOPEOFWORK	OCT79/OCT79DEC79/JAN80	E
423680	AWARDCONTR	DEC79/JAN80SEP80/	E
423680	USGNPROTO	SEP80/ FEB81/	E
423680	TESTPROTO	MAR81/ APR81/	E
4236	DELTOLOADPLANT	MAY81/ JUN81/	E
423680	DELTOPAFINALTECHRPT	SEP81/ SEP81/	E
423680	FINAL30IRTP	SEP81/ SEP81/ (ADD)	E
423773	PROCENGRSERV	OCT72/AUG72JAN73/MAY73	E
423773	FLOWDIA+SITSEEL	JAN73/MAY73MAR73/JUL73	E
423773	PILOTPLANTDSGN	FEB73/JUL73MAY73/AUG74	E
423774,76	COMPTHSIMUL	MAY73/MAY73MAR78/MAR78	E
423774	USGNREV	FEB75/FEB75JUN75/JUL76	E
423774	VENUORCNTRS	JUL75/JUL75OCT75/NOV75	E
423774	EQUIPPROC	NOV75/NOV75DEC75/MAR77	E
423774	EQUIPDEL	MAY76/MAY76MAR77/JUL77	E
423774,76	HAZARDSANAL	JAN74/JAN74SEP80/	E
423776	EQUIPINSTALL	JUN76/JUN77FEB77/JAN78	E
423776	MECHTESTOFEQUIP	APR77/NOV78MAY77/JAN79	E
423776	WHITECOMPDOXINSTUDY	MAR77/MAR77AUG77/OCT77(ADD)	E
423777	MECHTESTOFEQUIP	NOV78/NOV78DEC78/JAN79	E
423778	PILOTPLANTSTARTUP(PROVEOUT)	MAY79/ JUL79/	(DEL) E
423778	FINALRPT+HAZARDSANAL	MAR79/MAR79SEP80/	(ADD) E
423778	HAZARDSANAL	JAN74/JAN74JAN79/	(DEL) E
423778	PROJPHYSICALCOMPL	JUN80/JUN80JUN80/JUN80	E
423778	PROJ19CALCOMPL	JUN80/JUN80JUN80/JUN80	E
423778	PROJCLOSEOUT	JUN80/JUN80JUN80/JUN80	E
424974	DSGN	DEC73/DEC73MAR74/MAR74	E
424974	EQUIPPROC+INSTALL	MAR74/APR74JUN74/JUN75	E
424974	EQUIPEVAL	JUL74/JUL74MAR75/OCT75	E
424974	FINALRPT(FY74EFFORT)	APR75/MAR75SEP75/MAY77	E
424974	PILOTPLANTSTDY	MAY75/ OCT76/	(DEL) E
424974	BIRUPANNEVISFILTERSPEC	MAR76/MAR76OCT76/OCT76(ADD)	E
424975	PILOTPLANTSTUOTES	MAR75/ OCT76/	(DEL) E
424975	FINALRPT(FY75EFFORT)	SEP76/MAR77OCT76/JUN77	E
424977	BIRUPANNEVISFILTERPROC+INSTALL	DEC76/DEC76SEP77/JAN79	E
424977	EVALOFFILTER	OCT77/ DEC77/	(DEL) E
424978	HAZARDSANAL	AUG78/AUG78APR79/APR79(ADD)	E
424978	EQUIPTEST	JUL80/ AUG80/	E
424978	PILOTPLANTOPER	JUL79/ DEC79/	(DEL) E
424978	ECOEVAL	AUG79/ DEC79/	(DEL) E
424978	BIRUPANNEVISFILTERINSTAL	FEB79/FEB79JUN80/	(ADD) E
424978	FINALRPT	NOV80/ APR81/	E

424978	FINAL30IRPT	OCT80/	DEC80/	(ADD)	E
425274	EXPERTDYCONTROCFORMFGFRDX+HMX	SEP73/SEP73	DEC74/OCT77		E
425274	TDP	DEC74/	JAN75/	(DEL)	E
425274.75	PRODIMPLRDX/HMXPROCIMPV	JUL74/JUL74	DEC75/OCT74		E
425274.75	EQUIPPROC+INSTALL (ARRADCOMPILOTPLANT)	OCT74/OCT74	DEC75/MAY79		E
425275	EXPERTDYOFPROCFORMFGROX/HMX	SEP73/SEP73	DEC78/	(DEL)	E
425275	USEOF CRUDEACETICANHYDRIDE (LABSTUDY)	DEC74/DEC74	DEC75/SEP76		E
425275	FINALRPT	NOV77/NOV77	MAY79/JUN79		E
425277	PRODPROVEOUTCRUDEACGTICANHYDRIDE	MAR77/MAR77	JUN77/JUN77		E
425277	COMPC-4STUDY	JAN77/JAN77	JUN77/DEC77		E
425277	COMPC-4STUDY	DEC76/DEC76	JUN77/DEC77		E
425277	ENGRRPTPRODPROVEOUTCRUDEACETICANHYD	MAY77/JUL77	JUN77/JAN78		E
425277	COMPC-4STUDY	JUN77/DEC77	JUL78/APR79		E
425277	*A*COMPSTUDY	JUN77/DEC77	JUL78/JUN78		E
425277	RDX/HMXIYELDIMPVT	JUN77/OCT77	APR78/MAY79		E
425277	PILOTPLANTREACTVAROPT	JUN79/	NOV79/	(DEL)	E
425277	FINALRPT (FY77EFFORT)	FEB78/APR80	MAR78/JUN80		E
425278	PRODSIMMERPROC	MAR79/MAR79	MAR78/MAY80		E
425278	PRODSIMMERPROC	MAR79/MAR79	NOV79/	(DEL)	E
425278	MODHEXAMINEFEEDINCRHMXIYELD	APR80/	AUG80/	(DEL)	E
425278	ADJVARFOROPTIYELD	AUG80/	DEC80/	(DEL)	E
425278	PRODPROVEOUTRDX/HMXPROCIMPVT	JAN78/	JAN79/	(DEL)	E
425278	PILOTPLANTPREPOFSTOHMXBATC	OCT79/NOV79	DEC79/DEC79	(ADD)	E
425278	FINALRPT	APR80/APR80	JUL80/		E
425278	PILOTPLANTPROCVARSTDYFORMMX	DEC79/DEC79	JUN80/	(ADD)	E
426374	SYSTSTUDY	AUG73/NOV73	MAR74/DEC74		E
426374	PILOTPLANTLINELAYO	AUG73/NOV73	APR74/APR74		E
426374.75	PILOTPLANTDESIGN	NOV73/NOV73	APR76/APR76	(ADD)	E
426374	CONVEYORSYST			(DEL)	E
426374.75	PROJWORKSTAS			(DEL)	E
426374.75	EQUIPPDSGN	MAR74/MAR74	FEB76/MAR76	(ADD)	E
426374.78	INSTRUMENTATION+CONTROL	JUN74/MAY74	DEC74/MAY78		E
426375.77	PILOTPLANTCONSTRUCTION	MAR75/FEB77	NOV75/JUL78		E
426375.77	EQUIPPAB	FEB75/FEB77	JUN77/AUG77	(ADD)	E
426375.77	EQUIPPROUREMENT	JAN75/JAN75	JAN78/JAN78	(ADD)	E
426375.77	EQUIPTST	APR75/APR75	OCT77/OCT77	(ADD)	E
426376.77	PROCEQUIPINSTALL	SEP77/OCT77	MAY78/JUN78	(ADD)	E
426376	PILOTPLANTOPER	MAY78/JUN78	JAN80/APR80		E
426376	FINALREPORT	APR78/APR78	SEP80/		E
426379	FINAL30IRPT	APR80/	SEP80/		E
426680	DETUSGNASSLINEYST	JUN80/	NOV80/		N
426680	FABCRITASSINSPATESTSTA	AUG80/	DEC80/		N
426680	DEMOCRITASSINSPATESTSTA	DEC80/	MAR81/		N
426680	PROCEQUIP	MAR81/	SEP81/		N
426680	FABBALASSINSPATESTSTA	JUL81/	DEC81/		N
426680	DEMOASSLINE	DEC81/	FEB82/		N
426680	INTASSLINEINTOFUZEASSLINE	FEB82/	APR82/		N
426680	FINALTECHRT	JUN82/	JUN82/		N
426680	FINAL30IRPT	JUL82/	JUL82/		N
426775	LITSURV	JAN75/FEB75	MAR75/JUN75		E
426775	BENCHSCALESTDY	JAN75/JUL75	JAN76/AUG75		E
426775	PROCSIDY	JUN75/SEP75	JAN76/DEC75		E
426775	FINALRPT	JAN76/JUN77	APR76/JUN77		E
426777	DSNCRIT	OCT77/OCT77	DEC77/	(DEL)	E
426777	SITEPLAN	DEC77/	JAN78/	(DEL)	E
426777	PROCEVAL	OCT77/OCT77	MAR79/MAR79	(ADD)	E
426777.78	PRELIM HAZARD ANAL	JAN79/FEB79	APR80/		E
426777.78	FINAL HAZARD ANAL	MAY80/	SEP80/	(ADD)	E
426777.78	CNTRNEG	MAR79/APR79	AUG79/AUG79	(ADD)	E
426777	PRELIM PILOT PLT DSGN	AUG79/SEP79	FEB80/		E
426777	FINAL PILOT PLT DSGN	MAY80/	JUL80/	(ADD)	E
426777.78	EQUIPPROC+INSTALL	JUN80/	MAR81/		E
426777.78	INERTMECHCHECKOUTSYST	MAR81/	MAY81/		E
426777	FINALRPT	APR81/	JUN81/		E
426778	LIVECHECKOUT	JUN81/	AUG81/	(ADD)	E
426778	ENDITEMLOG/TEST	JUL81/	NOV81/	(DEL)	E

		SEP81/	DEC81/	(ADD) E
4267 78	FINALRPT	SEP75/SEP75	SEP75/SEP75	N
428076	FISCOBLIG	SEP75/SEP75	OCT75/SEP75	N
428076	SCOPEOFWORK	OCT75/JAN76	JAN76/MAR76	N
428076	CONIAWARD	JAN76/MAR76	JUL76/SEP76	N
428076	COMPLSTUDYPHASE	MAY76/JUN76	JUL76/AUG76	N
428076	COMPLSTUDYPHASE	JUN76/SEP76	AUG76/SEP76	N
428076	SCOPEOFWORK (AMEND)	NOV76/DEC76	DEC76/JAN77	N
428076	CONTRACT (AMENDED)	JAN77/JAN77	MAR77/AUG77	N
428077	SCOPEOFWORK	OCT77/DEC76	NOV76/JAN77	N
428077	CONTRAWARD	NOV76/JAN77	FEB77/AUG77	N
428077	EQUIPFAB	MAR77/APR77	DEC78/FEB79	N
428077	EQUIPDEBUG+MOD	DEC77/NOV77	JUN79/JUN79	N
428077	DOCUMENTATION	JAN78/JAN78	AUG79/DEC79	N
428077	FINALRPT	SEP79/NOV79	DEC79/DEC79	(ADD) N
428176THRU79	INVENTORYSELPLANTS	JUL75/JUL75	JAN80/	E
428176THRU79	EVALDATAFRINITIALPLANTS	DEC75/	OCT76/	(DEL) E
428176THRU79	EVALDATAFRSELPLANTS	APR76/APR76	APR80/	(ADD) E
428176THRU79	DEFOFTECHQNTS	JUL76/JUL76	MAR79/SEP79	(ADD) E
428176,77	APPLIRTHERMOGRAPHYFORPROCINVENTORY	JUL75/JUL76	OCT77/OCT77	E
428176	SELCONTR+ISSUECONT	MAY76/MAY76	SEP76/SEP76	E
428176	IDENTWASTEHEATRECAPPLS	OCT76/OCT76	AUG77/JUL77	E
428176	IDENTADWASTEHEATRECAPPLS	JAN76/OCT77	FEB78/NOV77	E
428176	FISCOBLIG	OCT75/OCT75	OCT75/OCT75	E
428176	ACTTEAMFORMED	OCT75/OCT75	OCT75/OCT75	E
428176	SAAPSURSCOPEOFWORK	OCT75/OCT75	OCT75/OCT75	E
428176	SAAPENERGYINVENTCONTPLECE	JAN76/JAN76	APR76/APR76	E
428176	SAAPENERGYINVENTORY	APR76/JUL76	FEB77/FEB77	E
428176	FISCOBLIG	OCT75/OCT75	OCT75/OCT75	E
428176	PREPSCOPEOFWORK	JUL75/JUL75	JUL75/JUL75	E
428176	PLACESTDYCONT	AUG75/AUG75	NOV75/JUN76	E
428176	CONDFORGESTDY	JAN76/JUL76	JUL76/FEB77	E
428176	PREPPLOTPRODSCOPEOFWORK	JUL76/JUL76	SEP76/SEP77	E
428177,78,79	INVENTORYRMGPLANTS	OCT76/	JUN77/	(DEL) E
428177,78,79	EVALDATAFRREEMPLANTS	DEC76/	OCT77/	(DEL) E
428177,78,79	DEFOFTECHREQ+COMPLFINALRPTS	OCT77/	MAR77/	(DEL) E
428177	SELCONTR+ISSUECONT	JAN77/FEB77	APR77/JUL77	E
428177	ESTABPERFDATA	APR77/JUL77	JUL78/FEB78	E
428177	PERFHAZARDSANALYSIS	JUN77/JUL77	JAN78/DEC77	E
428177	SAAPRPT	FEB77/FEB77	APR77/APR77	E
428177	LCAAPSCOPEOFWORK	OCT76/OCT76	NOV76/NOV76	E
428177	LCAAPCONTPLECE	DEC76/DEC76	APR77/JUN77	E
428177,78	LCAAPENERGYINVENTORY	APR77/JUL77	FEB78/NOV77	E
428177	PLACEPLOTPRODCONTR	JAN77/MAY77	JUL77/NOV77	E
428177	MAKEPILOTPRODQANT	FEB79/FEB79	MAR79/MAR79	E
428177	EVALRESPLOTPROD	APR79/APR79	APR79/APR79	E
428177	PREPFINALRPT	APR79/APR79	DEC79/	E
428178,79	FINALRPTS	DEC77/MAR78	JUL80/	(ADD) E
428178,79,80	ENGRDSNCONST+TESTPILOTFAC	JUL78/JUL78	MAY81/	(ADD) E
428178	FINALRPT	JUL78/JUL78	AUG78/AUG78	(ADD) E
428178	ENGRDSNPILOTFACFORADUWASTERECAPPLS	MAR78/	JUN78/	E
428178,79	ENGRDSNCONST+TESTPILOTFAC	JUL78/JUL78	MAR80/	E
428178	SELCONTR+ISSUECONT	JAN78/JAN78	JUL78/JUN78	E
428178	DETAVALBIOMASS+NSTL/MSAAPFUELREQMTS	JUL78/JUN78	AUG78/AUG78	E
428178	SUR+SELCOMMERAVAILPROCWOODWASTEUTIL	AUG78/AUG78	OCT78/NOV78	E
428178	PREPECO+ENVIRSTATEONSELUNIT	NOV78/DEC78	FEB79/AUG79	E
428178	FINALRPT	FEB79/AUG79	MAR79/	E
428178	SELCONTR+ISSUECONTFORPHASEII	APR78/APR78	JUL78/JUL78	(ADD) E
428178	DSGNPILOTPLANT	JUN80/	JAN81/	E
428178	PUR+INSTALLPILOTPLANT	JAN81/	JUN81/	E
428178	TESTEVALPILOTPLANT	JUN81/	JUL81/	E
428178	FINALRPT	AUG81/	SEP81/	E
428178	LCAAPRPT	MAR78/DEC77	MAY78/APR78	E
428178	ADCFEFFORTSDEF	APR76/APR76	FEB79/FEB79	E
428178	FINALRPT	FEB79/FEB79	MAY79/MAY79	E
428178	FISCOBLIG	OCT77/FEB78	OCT77/FEB78	E

428178	RECScopeOfWork	JUL77/SEP77AUG78/FEB78	E
428178	RECONPLACED	SEP77/APR78JUL78/JUL78	E
428178	PLANTDSGNSDY	AUG78/AUG78DEC78/DEC78	E
428178	OPTMECSYST	JAN79/JAN79JUN79/JUL79	E
428179	STATEOFMTRV	OCT79/SEP79DEC78/OCT79	E
428179	SELOFPROCTOBEEYAM	JAN79/ FEB79/ (DEL)	E
428179	SELOFINSLTYE*APPL	FEB79/NOV79JAN80/	E
428179	TESTOFSELAPPL	JUL79/ AUG79/ (DEL)	E
428179	EVALOFINSULBOILTUB	FEB80/ JUN80/ (ADD)	E
428179	FINALRPT*RECOM	JUL80/ SEP80/	E
428179	SURVEYGASUSAGE&THAAP	OCT78/AUG79 NOV79/NOV79	E
428179	ENGRSTDYOFCOALGASPROC	SEP79/ MAR80/	E
428179	EVALCOALGASFORUSEINRAAPPROC	NOV79/ MAY80/	E
428179	EVALOFALTPROC	MAR80/ MAY80/	E
428179	SELOFOPTIMUMSYST	APR80/ JUN80/	E
428179	HAZARDSANAL	NOV79/ APR80/	E
428179	DOC*FINALRPT	JUN80/ AUG80/	E
428179	CONST*TESTPILOTFACFORADDWASTERECAPPLS	JUL78/ JUN79/	E
428180	FINALRPT	APR81/ JUN81/	E
428179	FINALRPT	APR80/ JUN80/	E
428179	INTERFACERECYSTW/VARPLANTDSGNS	APR79/ AUG79/ (DEL)	E
428179	PROVGOCOSW/DATATOPREPP-15#S	MAR80/ MAY80/	E
428179	PREPFINALRPT	MAR80/ MAY80/	E
428180	ENGRDSGNPILOTFACFORADDWASTERECAPPLS	APR80/ JUN80/ (DEL)	E
428180	CONST*TESTPILOTFACFORADDWASTERECAPPLS	JUL80/ JAN81/ (DEL)	E
428180	FINALRPT(ADDWASTERECAPPLS)	FEB81/ MAR81/ (DEL)	E
428179	USGNOFRECOVSYSTSON	MAR79/MAR79MAY79/MAY79(ADD)	E
428179	AWARDOFCONTRACT	MAY79/MAY79OCT79/ (ADD)	E
428179	USGNOFRECOVSYST	OCT79/SEP79 MAR80/ (ADD)	E
428576	RECEIVEFUNDS	SEP75/SEP75SEP75/SEP75	E
428576	TESTPLANDEV	SEP75/SEP75JUL76/NOV76	E
428576	TEST*EVAL	NOV75/JAN76DEC76/JAN77	E
428576	GEOMETRYEFFECTS	DEC75/MAY76NOV76/NOV77	E
428576	REPIPREP*DISTRIBUTION	MAR76/MAR76FEB77/JUN78	E
428577	RECEIVEFUNDS	AUG76/AUG76AUG76/AUG76	E
428577	TESTEVAL	SEP76/SEP76JAN77/JAN77	E
428577	PREPOFTECHRPTS	FEB77/FEB77SEP77/SEP77	E
428577	FINALREPORT	AUG78/AUG78AUG78/AUG78	E
428577	RECEIVEFUNDS	OCT76/FEB77OCT76/FEB77	E
428577	SCOPEOFWORK	OCT76/MAY77NOV76/MAY77	E
428577	CONTRACTAWARD	OCT76/MAY77NOV76/AUG77	E
428577	TESTPLANDEVELOPMENT	OCT76/MAR77SEP77/SEP77	E
428577	TEST*EVAL	DEC76/JUN77NOV77/MAR78	E
428577	GEOMETRYEFFECTS	DEC76/AUG77NOV77/MAY78	E
428577	REPORTPREP*DISTRIBUTION	FEB77/AUG77DEC79/NOV79	E
428578	RECEIVEFUNDS	OCT77/DEC77OCT77/JAN78	E
428578	SCOPEOFWORK*CONTRACTAWARD	OCT77/JAN78DEC77/MAY78	E
428578	TESTPLANDEV	OCT77/JAN78DEC78/JAN79	E
428578	TEST*EVAL	DEC77/APR78NOV78/JAN80	E
428578	GEOMETRYEFFECTS	DEC77/DEC77NOV78/NOV79	E
428578	RPTPREP*DIST	FEB78/FEB78FEB79/MAY80	E
428579	RECEIVEFUNDS	OCT78/OCT78NOV78/DEC78(ADD)	E
428579	SCOPEOFWORK*CONTRACTAWARD	DEC79/DEC79MAR80/ (DEL)	E
428579	TESTPLANDEVELOP	NOV78/JAN79AUG79/AUG79(ADD)	E
428579	TEST*EVAL	FEB79/FEB79NOV79/NOV79(ADD)	E
428579	GEOMETRYEFFECTS	FEB79/FEB79NOV79/ (DEL)	E
428579	RPTPREP*DIST	JUN79/JUN79DEC80/ (ADD)	E
428579	FINAL301RPT	MAY81/	E
428580	RECFUNDS	OCT79/NOV79DEC79/NOV79(ADD)	E
428580	TESTPLANDEV	NOV79/NOV79 AUG80/ (ADD)	E
428580	TEST*EVAL	FEB80/ NOV80/ (ADD)	E
428580	GEOMETRYEFFECTS	FEB80/FEB80SEP80/ (ADD)	E
428580	RPTPREP*DIST	JUN80/ MAY81/ (ADD)	E
428580	FINALRPT301	MAY82/	E
428877	SAFESEPARATIONTESTS	JAN77/MAR77OCT78/OCT78	E
428877	PRIMARYFRAGIMPACTTESTS	MAR77/APR77OCT78/OCT78	E

428877	SECONDARYFRAGIMPACTTESTS	MAR77/APR77OCT78/OCT78	E
428877	PREPOTTECHRPTS	JUN77/JUN77OCT78/OCT78	E
428878	SAFESEPARATIONTESTS	DEC77/JAN78DEC79/DEC79	E
428878	PRIMARYFRAGIMPACTTESTS	DEC77/JAN78OCT79/OCT79	E
428878	SECONDARYFRAGIMPACTTESTS	DEC77/JAN78OCT79/OCT79	E
428878	PREPOTTECHRPTS	JUN78/JUN78JUN80/JUN80	E
428879	SAFESEPARATIONTESTS	OCT78/JAN79OCT80/	E
428879	PRIMARYFRAGIMPACTTESTS	OCT78/JAN79OCT80/	E
428879	SECONDARYFRAGIMPACTTESTS	OCT78/JAN79OCT80/	E
428879	PREPOTTECHRPTS	JUN79/MAY79OCT80/	E
428880	SAFESEPARATIONTESTS	DEC79/DEC79 DEC80/	E
428880	PRIMARYFRAGIMPACTTESTS	JAN80/JAN80DEC80/	E
428880	SECONDARYFRAGIMPACTTESTS	JAN80/JAN80 DEC80/	E
428880	PREPOTTECHRPTS	JUN80/JUN80SEP81/	E
428976	RECVOPONDS(RAAP1)	SEP75/SEP75SEP78/SEP78	E
428976	COMPHAZARDANALDATA	NOV75/NOV75AUG76/AUG76	E
428976	PROCTESTVEHICLES(RAAP1)	DEC76/DEC76FEB77/MAR77	E
428976	HALFSCALEMODELTESTS	FEB77/MAR77MAR77/APR77	E
428976	ONETHIRDSSCALEMODELTESTS	MAR77/MAR77APR77/MAR77	E
428976	ONEFOURTHSCALEMODELTESTS	APR77/MAR77MAY77/MAR77	E
428976	DATAREDUCT+ANAL	APR77/APR77MAY77/MAY77	E
428976	FINALRPT	JUN77/JUN77FEB78/FEB78	E
428976T	USGMATHMODEL	JAN78/JAN78APR78/APR78	E
428976T	SUBSCALETEST	MAR78/MAR78JUN78/JUN78	E
428976	CONTAWARD(IITRII)	FEB76/FEB76MAY76/MAY76	E
428976	COMPLFHAZARDSTESTDATA+ANAL	JUN76/JUN76NOV76/NOV76	E
428976	DEVOPINPROCHAZARDSCCLASSPROC	NOV76/NOV76JAN77/JAN77	E
428976	EVALSUBSCALETESTPROC	JAN77/JAN77AUG77/AUG77	E
428976	RECTULLSCALETESTPROC	AUG77/AUG77SEP77/SEP77	E
428977	CONTAWARD	JUL77/JUL77SEP77/NOV77	E
428977	COMP+ANALADDACCIDENTDATA	NOV77/NOV77FEB78/FEB78	E
428977	CONDSENS+EFFECTSTEST	JUN78/JUN78OCT78/OCT78	E
428977	FINALHAZARDSCCLASSPROC	SEP78/SEP78OCT78/OCT78	E
428977	INTERIMRPT	OCT78/OCT78NOV78/NOV78	E
428978	DATANAL(MODEL)	JUL78/NOV78AUG78/JAN79	E
428978	FINALRPT	SEP78/FEB79MAR79/MAY79	E
428978	CONTRAWARD(SUPPL)	MAR78/MAR78JUN78/JUL78	E
428978	COMPLTESTMETHVALIDS	NOV78/NOV78APR79/APR79	E
428978	REV+ASSESSPROCSFORINCORPINT8700-2	APR79/APR79JUN79/JUN79	E
428978	DRAFTPROCFSFORSAFETYAPPVL	JUN79/JUN79SEP79/SEP79	E
428978	COMPL+ANALPYROHAZARDTESTDATA(IV)	MAR78/MAR78SEP78/SEP78	E
428978	CONTESTTOEVALHAZARDDDUSTFORMATION	SEP78/SEP78NOV78/NOV78	E
428978	PREPPYROHAZARDSHDBK	NOV78/NOV78DEC78/DEC79	E
428978	FINALRPTHAZARDCLASSPROC	JUN79/JUN79DEC79/JUN80	E
428978	FINALRPT		
429176	ANALYTICALSTUDIES(TASK1)	OCT75/OCT75NOV76/NOV76	E
429176	TESTPLANDEV	OCT75/OCT75NOV76/NOV76	E
429176	TEST	JAN76/JAN76JUL77/JUL77	E
429176	TESTEVAL	JAN76/JAN76JUL77/JUL77	E
429176	RPTPREP	FEB76/FEB76NOV77/NOV77	E
429176	ANALYTICALSTUDIES(TASK2)	OCT75/OCT75MAR76/MAY76	E
429176	TESTPLANDEV	OCT75/OCT75MAY76/MAY76	E
429176	TEST	JAN76/JAN76OCT78/OCT78	E
429176	TESTEVAL	JAN76/JAN76NOV78/NOV78	E
429176	RPTPREP	FEB76/FEB76NOV78/NOV78	E
429177	TESTPLANDEV	JUN77/JUN77AUG77/AUG77	E
429177	TESTING(REV6)	MAY79/MAY79JUL79/JUL79	E
429177	TESTEVAL(REV6)	JUN79/JUN79SEP79/SEP79	E
429177	REPORTPREP(REV6)	AUG79/AUG79DEC77/JAN80	E
429179	ANALYTICALSTUDIES	JUN79/JUN79DEC79/DEC79	E
429179	TESTPLANDEV	SEP79/SEP79DEC79/DEC79	E
429179	TEST	JUN80/ SEP80/	E
429179	TESTEVAL	JUN80/ DEC80/	E
429179	REPORTPREP	JAN80/JAN80MAR81/	E
429179	FINALRPT	SEP81/	E
429180	RECVONDS	JAN80/JAN80JAN80/JAN80	E

429180	ANALSTUDYS	JAN80/JAN80JUN80/	E
429180	DEVUSGNCRIT	JUN80/ MAR81/	E
429180	RPTPREPADIST	SEP80/ SEP81/	E
429180	FINAL30IRPT	SEP82/	E
430979	RELPROGAUTHORI	MAY79/MAY79JUL79/JUL79	E
430979	ENGRREVAGENPROCSTDY	JUL79/JUL79DEC79/	E
430979	HAZARDANALI	JUL79/JUL79 JUN80/	E
430979	POLUTABATMENT	JUL79/JUL79JUN80/	E
430979	USGNSDVI	SEP79/SEP79JUN80/	E
430979	RELPROGAUTHORI	MAY79/MAY79MAY79/MAY79	E
430979	REVRADPROCARI	MAY79/JUN79SEP79/NOV79	E
430979	ESTABPRELIMPRONPROCII	JAN80/ MAY80/	E
430979	PROTOEQUIPUSGNI	APR80/ NOV80/	E
431075	PILOTPLANTSCOPEOFWORK	FEB75/FEB75MART5/MAR75	E
431075	FEASTEST(OMSOPROD)	APR75/APR75JAN77/DEC77	E
431075	PILOTPLANTDSGN	MART5/APR75JUL75/AUG76	E
431075.76.77	EQUIPPROCINSTALL	JUL75/OCT75JAN76/FEB78	E
431075	FINALRPT	SEP76/NOV77SEP76/JUN78 (ADD)	E
431076	PILOTPLANTTEST	(DEL)	E
431076	TDP	(DEL)	E
431076	FINALRPT	APR77/JUN78APR77/JUN78	E
431076.77	HAZARDSANAL	JAN77/MAR77JUN77/JAN78 (ADD)	E
431077	DEBUGPILOTPLANT	(DEL)	E
431077	EVAL*OPTOFPROC	(DEL)	E
431077	PROVEOUTCONTENNURRUN	(DEL)	E
431077	FINALRPT	APR78/JUN78MAY78/JUN78 (ADD)	E
431078	DEBUGPILOTPLANT	NOV78/NOV78JAN79/FEB79	E
431078	EVAL*OPTOFPROC	FEB79/FEB79SEP79/ (DEL)	E
431078	PROVEOUTCONTENNURRUN	(DEL)	E
431078	STARTAINITIALDEROFPROC	FEB79/FEB79AUG79/AUG79 (ADD)	E
431078	FINALRPT	JUN79/APR80AUG79/MAY80	E
431078	EVAL*OPTOFPROC	SEP79/AUG79NOV79/NOV79 (ADD)	E
431079	PROVEOUTCONTENNURRUNS	NOV79/OCT79 JAN80/NOV79 (ADDE	E
431079	PRODINCORP	DEC79/FEB80JAN80/MAY80 (ADD)	E
431079	PHY*CHEMTESTSOFPROD	AUG79/JAN80FEB80/ (ADD)	E
431079	FINALRPT-PROC	JAN80/JAN80AUG80/ (ADD)	E
431079	QUALTESTS	JUL80/ DEC80/ (DEL)	E
431079	ENDITEMTESTS	AUG80/ SEP81/ (DEL)	E
431079	FINALRPT-PROJ	JUN81/ DEC81/ (ADD)	E
431080	PROCTESTAEVAL	FEB80/FEB80SEP81/	E
431080	DOCTESTRESULTS	JUL81/ NOV81/	E
431080	FINALFY80RPT301	AUG81/ DEC81/	E
431080	OVERALLPROJFINAL30IRPT	AUG81/ DEC81/	E
431176	FISCALOBIGATION	OCT75/OCT75OCT75/NOV75	E
431176	SCOPEOFWORK	MAY75/MAY75OCT75/OCT75	E
431176	AWARDOFCONTRACT(PHASE1+2)	NOV75/NOV75MAY76/JUN76	E
431176	CONCEPTFORMULATION	JUN76/JUL76SEP76/OCT76	E
431176	USGNSBUILTFEASMODELS	JUN76/AUG76AUG76/JAN77	E
431176	DECOMODELS	JUL76/OCT76SEP76/JAN77	E
431176	PROIODSGN	JUL76/SEP76JAN77/FEB78	E
431176	MACHPROTORBUILD*TEST	FEB77/FEB77OCT79/OCT79	E
431177	FISCALOBIGATION	JAN77/JAN77JAN77/JAN77	E
431177	SCOPEOFWORK	SEP76/SEP76SEP76/SEP76	E
431177	AWARDOFCONTRACT	JAN77/JAN77MAR77/AUG77	E
431177	BUILDEQUIP	MAY77/AUG77SEP80/	E
431177	SHIPTOLOADPLANT	JAN79/JAN79OCT80/	E
431177	SETUPFINALACCEP	FEB79/FEB79DEC80/	E
431177	FINALDUP	NOV78/NOV78DEC80/	E
431177	FINALTECHRTP	JUN80/ JUN81/ (ADD)	E
431177	FINAL30IRTP	JAN81/ JAN81/ (ADD)	E
431279	PRELIMSTUDY	DEC78/DEC78JAN79/JAN79	E
431279	PREPSCOPEOFWORK	DEC78/DEC78MART9/APR79	E
431279	CONTRACTAWARD	MAY79/MAY79JUN79/AUG79	E
431279	HAZARDSANALYSIS	NOV79/DEC79SEP80/	E
431279	TEST*EVAL	MAY80/APR80FEB81/	E
431279	PROUDSGN	FEB81/ APR81/	E

431279	FINALRPT	APR81/	JUN81/	E
431280	PREPSCOPEOFWORK	SEP79/SEP79	MAY80/MAY80	E
431280	CONTRACTAWARD	JUN80/	JUN80/	E
431280	TESTAEVAL	JUL81/	MAR81/	E
431280	PRODDESGN	APR80/	MAY81/	E
431280	FINALRPT	APR81/	JUN81/	E
431280	FINALTECHRPT	JUN81/	JUL81/	E
432278.79	TAILOROFTECHBASE	AUG78/SEP78	SEP79/SEP79	A
432279	5CONTRACTAWARDS	JUL79/JUL79	SEP79/SEP79 (ADD)	A
432278	2NDREACTIVATIONJAAP	OCT78/OCT78	NOV78/NOV78 (ADD)	A
432278	3RDREACTIVATIONJAAP	APR79/APR79	MAY79/MAY79 (ADD)	A
432278	1STPHASESTANDRYSIMPLJAAP	AUG79/AUG79	DEC79/ (ADD)	A
432279	SHUTDOWNEPCSATVAAP	AUG79/AUG79	SEP79/SEP79 (ADD)	A
432278	4THREACTIVATIONJAAP	OCT79/OCT79	NOV79/NOV79 (ADD)	A
432279	DOCTORIENTVAAPLAYAWAY	OCT79/OCT79	OCT80/ (ADD)	A
432279	DEVBSGUNIFORMFAILUREKPTPROC	NOV79/NOV79	NOV81/ (ADD)	A
432278	2NDPMSESIMPLPRGJAAP	DEC79/DEC79	DEC80/ (ADD)	A
432279	IDENTINITIALDATABASESFAAP	JAN80/	JAN81/ (ADD)	A
432279	CYCLEPROCTAAP	JAN80/	JAN81/ (ADD)	A
432279	IDENTINITIALDATABASEVAAP	JAN80/MAR80	DEC80/ (ADD)	A
432279.80	IDENTPROCMULTIDNCSTORAGE	SEP79/SEP79	FEB81/ (ADD)	A
432278.79	COMPSYSSTEVAL	AUG78/SEP78	SEP80/	A
432278.79	ONSITEMEASDATAASE	AUG78/SEP78	JUN81/	A
432278.79.80	ONSITECYCLING	AUG78/SEP78	JUN81/	A
432278.79.80	ANALOF SUSPECTOPFAILED COMPS	AUG78/SEP78	JUN81/	A
432279	INTERIMRPT I, FY78 EFFORT	JUN79/JUN79	JUN80/	A
432279.80	DATA TREND ANAL	JUN79/	JUN81/	A
432279.80	SPAREPISPROVISIONING	SEP79/	JAN81/	A
432279.80	DEFOPPROCEDGUIDELINES	JUN79/	JUN81/	A
432279.80	DOC OF FINALRPT	JUN79/JUN79	FEB82/	A
432280	INTERIMRPT II, FY79 EFFORT	JAN80/	SEP81/	A
432278	FINALRTP (FY78-701)	MAR80/	JUN80/	A
432279	FINALRTP (FY79-701)	MAR81/	JUN81/	A
432280	FINALRTP (FY80-701)	JAN82/	APR82/	A
432878	PROJ AUTHORIZED	OCT77/JUL78	OCT77/JUL78	M
432878	PRCCOF PROTOCONTAINERS	MAY79/MAY79	NOV79/NOV79	M
432878	TESTPROTOCONTR	DEC79/DEC79	JUN80/	M
432878	PIDSGN (PID) PHASE	SEP78/SEP78	JUL80/	M
432878	PIPROTOREVIEW (PIPR)	JUL80/	JUL80/ (DEL)	M
432878	SELINALDSGN	JUN80/	JUL80/ (ADD)	M
432878	FINALRPTCOMPL	JUL80/	AUG80/ (ADD)	M
433279	RECEIPTOFFUNDS	FEB79/FEB79	FEB79/FEB79	M
433279	OBLIGATIONOFFUNDS	FEB79/FEB79	FEB79/FEB79	M
433279	INVESTIGATEALTERNATIVES	SEP79/OCT79	DEC79/JAN80	M
433279	SAMPLEFAB	JAN80/JAN80	JUN80/	M
433279	SAMPLETEST	JUL80/	AUG80/	M
433279	EVALUATION	AUG80/	SEP80/	M
433279	FINALRPT	SEP80/	OCT80/	M
433579	MASTERPLANREVIEW	SEP79/OCT79	SEP79/OCT79	M
433579	ENDRGPROCSTDYASEL	JAN80/NOV79	FEB80/DEC79	M
433579	FABPROCTOOLING	FEB80/JAN80	MAR80/MAR80	M
433579	MFRSAMPLEHARDWARE	MAR80/FEB80	OCT80/	M
433579	STATICDYNAMICTEST	OCT80/	JAN81/	M
433579	TESTEVALAPROCVFR	SEP80/	JAN81/	M
433579	TOOLINGMOD	JAN81/	JAN81/	M
433579	MFRCOMPONENTSFORFINALTEST	FEB81/	FEB81/	M
433579	CONDUCTSTATACANISTERFIRINGTEST	MAR81/	MAR81/	M
433579	CONDUCTFINEVAL	APR81/	APR81/	M
433579	DEVPROGSPECS	JAN81/	MAY81/	M
433579	MFRLOMPFORGYROVERIFTEST	FEB81/	MAR81/	M
433579	TESTOYKO	MAR81/	MAR81/	M
433579	EVALTESTRESULTS	MAR81/	APR81/	M
433579	FINALDATAPKG	APR81/	MAY81/	M
433579	COMPLETEFINALRPT	MAY81/	MAY81/	M
433776	TECH EVAL OF ORIG MATLS	SEP76/AUG76	OCT76/JAN77	M
433776	CONTAWARDPROCCANDIDATE MATLS	SEP76/MAR77	DEC76/MAY77	M

433776	INHOUSESTUDYOF CANDIDATE MATLS+PROC	OCT76/JAN77/JAN77/MAY77	M
433776	SELOF MATLS	JAN77/ FEB77/ (DEL)	M
433776	FABOFT ESTHWR	FEB77/ JUN77/ (DEL)	M
433776	TEST+ EVAL (TECH+ARRADCOM)	APR77/ SEP77/ (DEL)	M
433776	INCORP INTO DP	OCT77/ NOV77/ (DEL)	M
433776	INHOUSESEARCH FOR CAND MATLS+PROC	JAN77/JAN77/MAY77/MAY77	M
433776	INHOUSE EVAL OF ALT	OCT77/OCT77/JAN78/SEP78 (ADD)	M
433776	CONTAWARD EVAL ATC3PHASE I	AUG79/AUG79/APR80/APR80 (ADD)	M
433776	EVAL OF CONTR RESULTS ATC3PHASE I	APR80/APR80/MAY80/JUN80 (ADD)	M
433776	GATOR/GEMMS/RAAMUVSTUDYPHASE I	DEC79/DEC79/JUN80/ (ADD)	M
433776	ADAMUVSTUDYPHASE I	JAN80/ JUL80/ (DEL)	M
433776	GATORUVPHASE II	JAN80/ JAN81/ (DEL)	M
433776	GEMMSUVPHASE II	JAN80/ APR81/ (DEL)	M
433776	RAAMUVPHASE II	JAN80/ APR81/ (DEL)	M
433776	ADAMATC3TOP	MAR80/ MAY80/ (DEL)	M
433776	GATORUVTOP	MAY81/ AUG81/ (DEL)	M
433776	GEMMUTOP	MAY81/ AUG81/ (DEL)	M
433776	RAAMUTOP	MAY81/ AUG81/ (DEL)	M
433776	ADAMUVRPT	SEP80/ DEC80/ (DEL)	M
433776	GATORINSITU BONDING	AUG79/AUG79/NOV79/NOV79 (ADD)	M
433776	ADAMATC-3TOP	MAR80/ MAY80/ (ADD)	M
433776	GATORUTOP	MAY80/ JUN80/ (ADD)	M
433776	PROJECT COMPL	DEC80/ JAN81/ (DEL)	M
433776	FINAL RPT	FEB81/ FEB81/ (ADD)	M
433776	FINAL 3:1 RPT	JUN80/ JUL80/ (ADD)	M
433776	FINAL TECH RPT	JUN80/ JUL80/ (ADD)	M
433776	CONTRACT AWARD (10PPMTAPESTIFFASSY)	JUN78/JUN78/JUL78/JUL78	M
433776	PROTODSGN COMPLETE	AUG78/JUL78/OCT78/JUL78	M
433776	PROTODSGN COMPLETE	OCT78/AUG78/JUL80/	M
433776	INSTALL COMPLETE	AUG80/ SEP80/	M
433776	TDP/DOFN/FINAL OPT COMPLETE	MAY79/ SEP79/ (DEL)	M
433776	WORK COMPLETE	JUN78/JUN78/MAY80/ (DEL)	M
433776	PROTODSGN COMPLETE	OCT80/ NOV80/ (ADD)	M
433776	FISCAL OBLIGATION (90PPMTAPESTIFFASSY)	FEB76/MAY76/FEB76/MAY76	M
433776	CONCEPT STUDY FOR SOW	APR76/AUG76/APR76/AUG76	M
433776	CONCEPT STUDY FOR ADV FORBIDS	APR76/SEP76/APR76/OCT76	M
433776	CONCEPT STUDY INITIATED CONTRACT AWARD	JUN76/SEP76/AUG76/SEP76	M
433776	FEASDSOW/PROCCOMPL	AUG76/NOV76/AUG76/NOV76	M
433776	FEASEQUIP/PROCCOMPL	AUG76/NOV76/JAN77/FEB78	M
433776	FEASTEST COMPL	APR78/FEB78/JUN78/	M
433776	PROTODSGN COMPL	MAY79/ NOV79/	M
433776	PROTODSGN COMPL	AUG79/ MAR80/	M
433776	INSTALL COMPL	MAR80/ MAY80/	M
433776	TDP/DOFN/FINAL RPT COMPL	MAR80/ MAY80/	M
433776	TDP/DOFN/FINAL OPT RELEASED	MAY80/ JUN80/	M
433776	WORK COMPL	FEB76/ JUN80/	M
433776	FISCAL OBLIGATION (AUTOGRENADE MACH)	FEB76/MAY76/FEB76/MAY76 (DEL)	M
433776	CONCEPT STUDY FOR SOW	APR76/AUG76/APR76/AUG76 (DEL)	M
433776	CONCEPT STUDY FOR ADV FORBIDS	APR76/SEP76/APR76/OCT76 (DEL)	M
433776	CONCEPT STUDY INITIATED CONTRACT AWARD	JUN76/SEP76/AUG76/SEP76 (DEL)	M
433776	FEASDSOW/PROCCOMPL	AUG76/NOV76/AUG76/NOV76 (DEL)	M
433776	FEASEQUIP/PROCCOMPL	AUG76/NOV76/JAN77/FEB78 (DEL)	M
433776	FEASTEST COMPL	JAN77/FEB78/APR78/ (DEL)	M
433776	PROTODSGN COMPL	APR77/MAY78/JUN77/ (DEL)	M
433776	PROTODSGN COMPL	JUN77/ MAR78/ (DEL)	M
433776	INSTALL COMPL	MAR78/ MAR78/ (DEL)	M
433776	TDP/DOFN/FINAL OPT COMPL	MAR78/ NOV78/ (DEL)	M
433776	TDP/DOFN/FINAL OPT RELEASED	NOV78/ JAN79/ (DEL)	M
433776	WORK COMPL	JAN79/SEP77/MAR79/ (DEL)	M
433776	FINAL RPT	DEC80/ (ADD)	M
434177	CONTAWARD	JAN77/APR77/JAN77/APR77	E
434177	MARKET SUR OF PROC+ EQUIP	MAR77/MAR77/MAY77/JAN78	E
434177	INTERIM TRPT	MAY77/MAY77/MAY77/MAY77 (ADD)	E
434177	BENCHSCALE STDY	JUN77/JUN77/OCT77/MAR79	E
434177	ECOSTD OF PROC+ EQUIP	AUG77/AUG77/NOV77/APR78	E
434177	HAZARD ANAL	JUL77/JUL77/DEC77/MAR79	E

434177	PRELIMSELOFEQUIP	OCT77/OCT77JAN78/FEB78	E
434177	INTERIMLTRRPT	DEC77/DEC77DEC77/FEB78	E
434177	FINALRPT	MAR79/MAR79 MAR79/MAR79	E
434178	PROCOFEQUIP	SEP80/AUG79AUG80/	E
434178	HAZARDSANAL	MAY79/APR79FEB81/	E
434178	SELOFEQUIP	SEP79/SEP79 JAN80/MAR80	E
434178	FINALSTATUSRPT	DEC80/ DEC80/	E
434178	PROCDASSURANCE	OCT79/OCT79FEB81/	E
434179	INSTALLOFPROCEQUIP	SEP79/MAR80OCT80/	E
434179	CNTLSYSTDEV	DEC79/FEB80FEB81/	E
434179	EQUIPCHECKOUT	SEP80/ DEC80/	E
434179	FINALSTATUSRPT	JUN81/ JUN81/	E
434180	EVALOFPROCEQUIP	JAN81/ JUN81/	E
434180	FINALSTATUSRPT	DEC81/ DEC81/	E
434181	FINALSTATUSRPT	JUN82/ JUN82/	E
434181	FINALTECHRPT	OCT81/ MAR82/	E
434377	FUNDSTRANSTOGOCO	MAR77/MAR77JUL77/OCT77	E
434377	EVALOFPROCNTLPARAMETERS	OCT77/OCT77SEP79/SEP79	E
434378	FINALRPT	APR79/MAY79OCT79/MAR80	E
434377	LIT+CNTRLRECEXAM	OCT77/OCT77AUG78/SEP78	E
434378	FINALSTATUSRPT	APR77/APR77APR77/APR80	E
434378	FINALTECHRPT	JAN80/APR80JUN80/	E
436277	PROCCINVESTIGATION	JUN77/JUN77AUG77/AUG77	E
436277	EQUIPPROUREMENT	JUN77/JUN77SEP77/JAN78	E
436277	CONILCOOLPROCFV	DEC77/FEB78JUL80/	E
436277	BASELINEDSGNCRITERIA	JUN77/DEC77FEB79/FEB79	E
436277	FINALRPT	JUL79/JUL79 DEC80/	E
436277	FINAL301RPT	DEC80/ JAN81/ (ADD)	E
441077	SINTERIOSHAPENNNAMETAL	NOV76/MAY77APR77/JUL77	Q
441077	SINTERIOSHAPETELEDYNE	NOV76/APR77APR77/MAY77	Q
441077	EVALTWOSTEPSSWAGEKENNAMETAL	NOV76/APR77JAN77/NOV77	Q
441077	EVALONESTEPSSWAGEKENNAMETAL	MAY77/MAY77SEP77/NOV77	Q
441077	EVALVARIEDDIESWAGETELEDYNE	FEB77/JUL77JAN78/FEB78	Q
441077	FINALEVALSTEPSSWAGE	DEC77/DEC77AUG79/AUG79	Q
441077	FINALEVALVARIENSWAGE	JAN78/FEB78SEP79/SEP79	Q
441077	FINALRPT	SEP79/NOV79OCT79/DEC79 (ADD)	Q
443177	AWARDCONTRACT	JAN77/JAN77JUN77/NOV77	E
443177	CONCEPT/DSGNEQUIP	SEP77/NOV77AUG78/MAR79	E
443177	RULDEQUIP	OCT78/OCT78JUN78/	E
443178	AWARDCONTRACTPHASE3+4	NOV77/JUL78JAN78/SEP78	E
443178	TESTEQUIP(CONTR)	JUL78/MAY79AUG79/	E
443178	SHIP+INSTALLLEGUAPATMAAP	SEP78/MAY79OCT78/	E
443178	INERT+LIVETESTCATMAAP	NOV78/ DEC78/	E
443178	TDF+UMPL	APR78/OCT78DEC78/	E
443178	SUBMITFINALRPT	JAN79/JAN80FEB79/JAN80	E
443178	FINALIZETDP	JAN79/ FEB79/	E
444477	PROJAPPROVAL	JUL76/AUG76JUL76/AUG76	M
444477	FISCALOBIGATION	JUL76/AUG76JUL76/AUG76	M
444477	SCOPEOFWORK	MAY76/MAY76MAY76/MAY76	M
444477	ADFORBIUS	OCT76/OCT76DEC76/DEC76	M
444477	CONTRACTAWARD	FEB77/APR77FEB77/APR77	M
444477	CONCEPTSTUDY	APR77/MAY77SEP77/SEP77	M
444477	CONCEPTREVIEW	SEP77/SEP77OCT77/OCT77	M
444477	FINALRPT	/MAY80	M
444478	PROGAUTH	JAN78/JAN78JAN78/JAN78	M
444478	FISCUBIGATION	JAN78/JAN78JAN78/JAN78	M
444478	SELECTBESTAPPROACH	AUG78/AUG78SEP78/OCT78	M
444478	DEVPROCPKG	NOV78/MAR77DEC78/MAY79	M
444478	CONTRACTAWARD	JAN78/JUN79JUN80/	M
444478	ESTABPILOTLINE	MAR78/ AUG78/ (DEL)	M
444478	MFGBOOLES	OCT78/ JUN79/ (DEL)	M
444479	PROGAUTH	JUL79/SEP78JUL79/ (DEL)	M
444479	FISCUBIGATION	SEP78/SEP78NOV78/DEC78	M
444479	LAPPROJS	FEB82/ MAR82/	M
444479	PROJBALLISTICFTSTS	APR82/ JUL82/	M
444479	EVALRESULTS	JUL82/ SEP82/	M

444479	PERFORMLOCALTESTS	JUL79/	SEP79/	(DEL)	M
444479	AMENDTUP	APR80/	MAY80/	(DEL)	M
444479	SURVEILLANCE	MAY80/	SEP80/	(DEL)	M
444479	FINALRPT	SEP81/	OCT81/		M
444478	TDPTUPROC	MAY79/MAY79	MAY79/JUN79		M
444478	PREP0FCNTRDWR	JUL80/	NOV80/		M
444478	APPRVLOFDJGSRVARRADCOM	NOV80/	DEC80/		M
444478	FABOP20RNDY	JAN81/	MAY81/		M
444478	TESTAEVAL270RNDY	JUN81/	SEP81/		M
444478	FABOP1/109RNDY	OCT81/	DEC81/		M
444478	ACCEPTUFRNDYBYARRADCOM	DEC81/	JAN82/		M
444478	FINALRPT		FEB82/		M
444479	LAPATLSAAPCOMPLETE	MAR81/			M
444479	HALLISTICCCOMPLETE	JUN81/			M
444479	FINALRTP-TECH	SEP82/	OCT82/		M
444479	FINALRTP-301	OCT82/	OCT82/		M
444478	LITSEARCH	MAR78/MAR78	APR78/APR78		E
444478	EVAL+SELUFALTS	MAY78/MAY78	FEB79/APR79		E
444478	DEV+ADJUSTCFMT+DS+CNLS	JUL78/JUL78	APR79/SEP79		E
444478	RPT	APR79/SEP79	SEP80/		E
444478	DEV OFICMETHON	JAN80/JAN80	AUG80/	(ADD)	E
444478	FINALTECHRPT				
444478	TESTLOTIFG(2TESTLOTS)	OCT78/NOV78	OCT78/NOV78		E
444478	EXTRUDE2TESTLOTS	APR79/APR79	MAY79/APR79		E
444478	EVAL2TESTLOTS	MAY79/APR79	JUN79/APR79		E
444478	TEST(EN)ITEMS)	JUN79/APR79	AUG79/APR79		E
444478	FINALRPT(2TESTLOTS)	AUG79/OCT79	OCT79/NOV79		E
444478	PILOTPLANTENGROSGN	JAN78/	OCT79/		E
444478	HAZARDSANAL	APR79/	AUG79/	(DEL)	E
444478	EGLIPPHOC	APR79/	JUN79/	(DEL)	E
444478	SITEPRP+EQUIPINSTALL	APR79/	JUL79/	(DEL)	E
444478	OPERTRAINING	APR79/	JUL79/	(DEL)	E
444478	EGLIPTEST	AUG79/	OCT79/	(DEL)	E
444478	PHCCEVAL	NOV79/	APR80/	(DEL)	E
444478	ECCEVAL	FEB80/	MAY80/	(DEL)	E
444478	FINALRPT	FEB80/FEB80	JUL80/		E
444478	MFGRADUTE5TLOTS	JUN79/NOV79	JUL79/NOV79	(ADD)	E
444478	EXTRUDEADUTESTLOTS	JUL79/DEC79	AUG79/DEC79	(ADD)	E
444478	EVALADUTE5TLOTS	AUG79/DEC79	OCT79/DEC79	(ADD)	E
444478	FINALRPT(ADUTESTLOTS)	DEC79/DEC79	JUL80/	(ADD)	E
44577T	FUNDSRECVARRCOM		/AUG76	(ADD)	E
44577T	FUNDSRECVIAAP		JUL76/AUG76		E
44577T	PCANARUS	AUG76/OCT76	FEB77/FEB77		E
44577T	MATERIALRECVD	NOV76/NOV76	JUL77/SEP77	(ADD)	E
44577T	FABRICATION	SEP76/NOV76	MAY77/MAY77		E
44577T	MACMASBY	JAN77/MAR77	JUN77/AUG78		E
44577T	DEEUG	MAY77/MAY77	JUL77/OCT78		E
44577T	TEST	AUG77/NOV78	AUG77/NOV78		E
44577T	FINALRPT	SEP77/JAN79	OCT77/AUG79		E
44577T	PROCPRO	SEP77/	OCT77/	(DEL)	E
446479	DEVANAL+CONTRCITERIA	JAN79/JAN79	SEP79/SEP79		E
446479	PROCD+DELIVERYOFINSTRUMENTATION	OCT79/	MAY80/	(DEL)	E
446479	INSTALLOFINSTRUMENTATION	JUN80/	JUL80/	(DEL)	E
446479	HAZARDSANAL	JUN80/	SEP80/		E
446479	EVALINSTRUMENTATION	JUL80/	NOV80/	(DEL)	E
446479	FINALRPT	JUN80/	SEP80/		E
446479	CONPDAT+CONCEPTSYS	JAN79/JAN79	SEP79/SEP79	(ADD)	E
446479	EVALDAT+CONCEPTSYS	SEP79/SEP79	JAN80/APR80	(ADD)	E
446479	DEVANAL+CONTRCITERIA	JAN80/APR80	JUN80/	(ADD)	E
446479	PREPRUCSCOPEFORANALEQUIP	JUN80/	SEP80/	(ADD)	E
446479	FINAL30TRPT	JUN80/	SEP80/		E
446277	ENGDATAHFV	AUG77/AUG77	MAY78/MAY78		E
446277	LAB+BENCHSCALFSTDYS	OCT77/SEP77	MAY78/MAY78		E
446277	HAZARDSANALYSTC	MAR78/APR78	MAY78/JUL78		E
446278	ENGSTDYS	SEP78/SEP78	JUL80/		E
446278	HAZARDSANALII	SEP78/SEP78	DEC79/DEC79		E

446278	EQUIPPROCFORFADDBAYMOD	OCT78/OCT78MAY79/DEC79	E
446278	BLDGMOD	NOV78/NOV78JUN79/MAR80	E
446278	PROCNGBSCRUBBERTANKS+PUMPS	FEB79/FEB79AUG80/	E
446278	SUBMITABSORBERNSGN+DWGS	MAY79/MAY79JUN80/	E
446278	DATAACQUISITION	OCT78/OCT78FEB79/DEC79	E
446278	EVALOFMODFADDBAY	APR80/APR80JUL80/	E
446279	HAZARDANAL	JUL79/OCT79SEP80/ (ADD)	E
446279	COMPLSOLVENTABSORBOSGN	AUG79/MAR80JUN80/	E
446279	PROCOFSOLVENTABSORBOSGN	MAR80/ SEP80/ (ADD)	E
446279	INITPROCOFSOLVENTABSORBER	AUG79/AUG79JUL80/ (ADD)	E
446279	SITEPREPINSTALLOFNGSCRUBBERTANKS+NGMO	JAN80/JAN80SEP80/ (ADD)	E
446279	EVALNGSCRUBBER+NGMONITOR	SEP80/ NOV80/ (ADD)	E
446279	DATAACQUIS.PRELIMINSTRUDSGNFORFADCOM	DEC79/DEC79NOV80/ (ADD)	E
446279	HEATPIPESTUDY	DEC79/DEC79APR80/APR80	E
446280	HAZARDSANALYSISIVT4	AUG80/ OCT81/ (ADD)	E
446280	PROCOFSOLVENTABSORB	JUN80/ DEC80/ (ADD)	E
446280	INSTALLSOLVENTABSORB	JAN81/ APR81/ (ADD)	E
446280	EVALFADDBAY+NGSCRUBBER	APR81/ JUL81/ (ADD)	E
446280	FACILITYDESIGNCRITERIA	FEB81/ OCT80/ (ADD)	E
446280	DOCFINALRPT	JUL81/ APR82/ (ADD)	E
446280	DATAACVAPRELIMINSTRUDSGNCONCFADII	MAY81/ SEP81/ (ADD)	E
446280	FINALTECHRPT	JUL81/ APR82/	E
446280	FINAL30TRPT	JUN82/ JUN82/	E
446678	STUDYEXISTMETHODSOFTNTLDG	FEB78/FEB78APR78/APR78	E
446678	STUDYINSTRUMENTATION	FEB78/FEB78MAY78/MAY78	E
446678	MODAUTUMELTSYST	DEC79/ JAN80/	E
446678	PROCTNTOCTOL+CYCLOTOL	APR78/APR78FEB78/FEB80	E
446678	INSTALLINSTRUMENTATION	JUL78/NOV78AUG78/FEB79	E
446678	PILUTLINETEST	AUG78/MAY80FEB78/MAY80	E
446678	TECHRPT (INTERIM)	FEB80/ MAR80/	E
446679	DSGNSPCSMIXINGSYST	JAN79/JAN79MAR79/MAR79	E
446679	PROCUREMIXINGSYST	MAR79/FEB79DEC80/	E
446679	HAZARDSANALYSIS	NOV79/NOV79JUN80/	E
446679	INSTALLMIXINGSYST	JAN81/ APR81/	E
446679	PROTOTEST	MAY81/ AUG81/	E
446679	FINALTECHRPT	AUG81/ NOV81/	E
446678	FINAL30TRPT	SEP80/	E
446679	FINAL30TRPT	JUN81/	E
446978	PROGRAMAUTHORIZATION	NOV77/JAN78NOV77/JAN78	E
446978	AWARDPHASE1CONTRACTFORM483	FEB78/FEB78JUL78/JUL78	E
446978	CONCEPT+FEASSTUDIES	JUL78/JUL78OCT78/ (DEL)	E
446978	DSGNPROTOFORM483	OCT78/ APR79/ (DEL)	E
446979	REVCOPESOFWORKFORODUALCAPABILITY	JAN79/JAN79FEB79/FEB79 (ADD)	E
446978	DSGNABUILDINSPEVICE	OCT78/OCT78SEP79/SEP79	E
446978	PROGRAMAUTHORIZATION	DEC78/MAY79DEC78/MAY79	E
446979	AWARCONTRACT	MAY79/MAY79SEP79/SEP79 (ADD)	E
446979	AWARDPHASE2CONTRACTFORM483+M509	DEC78/ APR79/ (DEL)	E
446979	CONCEPT+FEASSTUDIESFORM509	MAY79/ JUL79/ (DEL)	E
446979	BUILDPROTOEQUIPFORM483	APR79/ OCT79/ (DEL)	E
446979	DSGNPROTOFORM509	JUL79/ JAN80/ (DEL)	E
446979	BUILDPROTOFORM509	JAN80/ JUN80/ (DEL)	E
446979	INSIAL+ACCEPTTESTEQUIPFORM483+M509	JUL80/ SEP80/ (DEL)	E
446979	COMPLTUP/DOFM+FINALRPT	JUL80/ OCT80/ (DEL)	E
446979	DSGN+BUILDCONCEPTMODELS	SEP79/SEP79JUL80/ (ADD)	E
446979	DEBUG+EVALCONCEPTMODELS	DEC79/OCT79AUG80/ (ADD)	E
446979	USGNABUILDOSYSPROTO	FEB80/SEP79MAR81/ (ADD)	E
446980	RECVDFUNDS	NOV79/NOV79NOV79/NOV79 (ADD)	E
446980	BUILDOSYSPROTO (DUAL)	NOV79/ MAY80/ (DEL)	E
446980	DEBUGPHOTOW/INERT	SEP80/ MAY81/ (ADD)	E
446980	SHIP+INSTALL+GOCO	JAN81/ JUN81/ (ADD)	E
446980	DEBUG+SHAKEDOWNW/HE	FEB81/ JUL81/ (ADD)	E
446980	ACCEPTA+GOCOW/HE	MAR81/ AUG81/ (ADD)	E
446980	TDPFORMPLICATFS	JUN81/ SEP81/ (ADD)	E
446980	FINALRPT	APR81/ SEP81/ (ADD)	E
447278	RECPTOFFUNDS	OCT77/DEC77	E
447278	CONTRACTAWARD	JAN78/JAN78JUL78/AUG78 (ADD)	E

447278	FEASSTUDY OF ALTERNATE CONSIDERATION	OCT77/AUG78MAY78/JAN79	E
447278	DETERMINEST APPROACH FOR HAGFAB	JUN78/JAN79JUL78/JAN79	E
447278	DEV SELECT CONCEPT	APR79/MAY79JUL79/JUL79 (ADD)	E
447278	PREPARE SCOPE OF WORK	FEB79/FEB79DEC79/ (DEL)	E
447278	JURY RIG TEST	MAR79/APR79JUL79/JUL79 (ADD)	E
447278	FINAL TECH RPT		
447278	FINAL 301 RPT	JUN80/JUN80	E
447479	ENGR STUYS MARKET SURVEY	MAY79/SEP79 JUL80/	E
447479	LAB/BENCH SCALE FSTDY	JAN80/JAN80JUL80/	E
447479	HAZARD ANAL	JAN80/JAN80JUL80/	E
447479	FINAL RPT	JUL80/ AUG80/	E
448177	ENGR ANAL OF PYROLYSIS SYST	SEP77/SEP77AUG78/AUG78	E
448179	SELECT CNTR ISSUE CONTRACT	DEC78/ APR79/	E
448179	USGNOF PILOT PLANT	MAY79/ OCT79/	E
448179+80	PURCHASE EQUIP	NOV79/ MAR80/	E
448180	INSTALL PILOT PLANT	APR80/ AUG80/	E
448180	EVAL PILOT PLANT	SEP80/ JAN81/	E
448180	FINAL RPT	FEB81/ MAR81/	E
449278	CONDUCT STUDY PROGRAM	MAR78/MAR78MAY78/MAY78	M
449478	FEASSTUDY	SEP78/SEP78DEC78/FEB79	M
449478+79	USGNEQUIP	SEP78/SEP78JAN81/	M
449478	FAB+INSTALL EQUIP	MAR79/ SEP80/ (DEL)	M
449479+80	FABEQUIP	MAR80/MAR80APR81/ (ADD)	M
449479+80	INSTALL EQUIP	JUL80/ MAY81/ (ADD)	M
449880	DEBUG EQUIP	JUL80/ JUN81/	M
449880	FINAL RPT	DEC80/ DEC80/	M
449878	FINAL RPT 301	SEP80/ SEP80/ (ADD)	M
449879	FINAL 301 RPT	SEP81/ SEP81/ (ADD)	M
449880	FINAL 301 RPT	DEC81/ DEC81/	M
450478	ENG DATA COMPL	DEC78/OCT78JAN78/JAN79	E
450878	EVAL COATTECHS	JAN78/JAN79MAY78/MAY79	E
450878	HAZARD ANAL	MAY79/MAY79SEP79/MAY80 (ADD)	E
450878+79	PILOT PLANT DSGN CRIT+DSGN	JAN79/JAN79SEP80/	E
450878	FINAL RPT FY78	NOV79/ DEC80/	E
450879	ENCL DRYER+D+DISCHARGE (A7)	FEB79/FEB79APR79/MAR79	E
450879	COVER PHOTO CELL MORTS (A7)	FEB79/FEB79FEB79/FEB79	E
450879	INSTALL MAKEUP AIR SYST (A7)	FEB79/FEB79FEB79/FEB79	E
450879	INSTALL ATRES LIHRY SYST (A7)	FEB79/FEB79MAY79/MAY79	E
450879	INSTALL ASH+SC+UH WATERS SYST (A7)	MAR79/FEB79JUN79/MAY79	E
450879	DEV CNTLSYST (A7)	JUN79/FEB79AUG79/MAY79	E
450879	EVAL MOD (A7)	JUN79/MAY79AUG79/MAY79	E
450879	FINAL RPT (A7)	JUN79/JUN79SEP79/AUG79	E
450879	INSTALL WYSSMONT TURBODRYER	NOV80/ MAR81/ (ADD)	E
450879	FINAL RPT FY79	MAR81/ MAY81/	E
450880	HAZARD ANAL INFRT	MAY80/MAR80MAR81/	E
450880	EIMC OF ILTFR ENR DSGN	SEP80/ JAN81/	E
450880	EIMC OF ILTFR INSTALL	FEB81/ JUN81/	E
450880	COATING EVALA 3044	SEP80/ DEC80/	E
450880	EIMC OF ILTFR TEST	JUL81/ AUG81/	E
450880	EIMC OF ILTFR EVAL	SEP81/ JAN82/	E
450880	FINAL RPT FY80	DEC81/ APR82/	E
621174	MATL PRUC	JUL73/SEP73SEP73/OCT73	Q
621174	PERFORM DSGN	JUL73/SEP73DEC73/DEC73	Q
621174	PHCCENG	OCT73/OCT73MAR74/MAR74	Q
621174	FAB PROTOPREFORMS	JAN74/JAN74JUN74/JUN74	Q
621174	PROFORM 4A2BUNDIES	APR74/APR74JUN74/SEP74	Q
621174	HALLIST ICTEST+FVAL	JUL74/OCT74DEC74/NOV75	Q
621175	OPTOP MATL	NOV74/NOV74FEB75/AUG75	Q
621175	OPTOP PREFORM DSGN	NOV74/NOV74FEB75/AUG75	Q
621175	FABOP+TTOOLS	JUN75/JUN75AUG75/AUG75 (ADD)	Q
621175	MODOP FURMTOLS	JUN75/JUN75OCT75/NOV75 (ADD)	Q
621175	FABOP+PREFORMS	SEP75/OCT75OCT75/NOV75 (ADD)	Q
621175	FABXMT2 BUNDIES	OCT75/DEC75MAY76/MAR76 (ADD)	Q
621175	TECH RPT (COLDPROC)	JAN76/FEB76MAY80/ (ADD)	Q
621175	FABPREFORMS	NOV76/APR77JUN77/MAY77 (ADD)	Q
621175	FABNCCCHUTIES	MAR77/MAY77JUL77/JUN77 (ADD)	Q

621175 PITTEST
 621175 PANELTEST
 621175 TECHRPT (HCCCPRC)
 647276 FUNDSRECD
 647276 FEASSTDYSCOPEOFWORK
 647276 CNTRAWARD
 647276 FEASDSGN
 647276 FEASDSGN/PROCSTDY
 647276 FEASTESTS
 647276 APPVLOFSELDSGN/PROC
 647276 APBIDSPROTO
 647276 CONTAWARUPROTO
 647276 PROTDOSGN
 647276 PROTOFAB
 647276 PROTOTEST
 647276 PROTOACCEPT
 647276 TDP
 647276 FINALRPT
 655373 FINALRPT
 655374 FINALRPT
 655377 FINALRPT
 655379 AUTHFUNDS
 655379 PREPCOORDSTPLAN
 655374 CONTRACTSCOPPROFWORK
 655379 AWARDCONTRACT
 655379 FRABTSTSTN
 655379 PREPOPINSTACAI PROC
 655379 REALTACALRACOUSTICINSPSYS
 655379 PREFORMPRODLINFIST
 655379 EVLAPPROVEAISTSTMETHDATA
 655379 PREPAISOPERAMINTMANUAL
 655379 PREPPURCHASEDFSCRFORALS
 655379 APPVUTESTSTDS
 655379 EVALTESINRESULTS
 655379 FINALAISOPERAMINTMANUAL
 655379 PREPREHESFORALS
 655379 FINALTECHRPT
 655474 FINALRPT
 655475 FUNDING
 655475 SCOPE
 655475 PROCACTION
 655475 CONTRXECUTE
 655475 EQUIPINSTALL+HWRPREP
 655475 TEST+EVAL
 655475 FINALRPT
 662578 AWARDCONTRACT
 662578 PHASEIIISTRMTOFINERTIAWELDER
 662578 MEASUREMENTWELDPARA
 662578 PHASEIIACQUISOFYSTCNTLHDWR
 662578 DEVSOFTHAREFORADAPTHACHCNTL
 662578 FINALRPT
 662576 FUNDING
 662576 PREPSCOPE/AUFORBIDS
 662576 CONTAWARD
 662576 DSGN
 662576 FAB
 662576 ACCEPTTEST
 662576 TDP
 662576 FINALRPT
 662576 DEMOM577CONTMOD
 662576 DEMO(FEAS)TEST
 662576 EVALREDESIGNRPT
 662576 INCRCONTFUNDS+MOD
 664076 CONTPROC
 664076 PRODOF60LINERS
 664076 PRELIMTESTONLINERS

JUN77/NOV77OCT77/NOV78(ADD) Q
 JUL77/OCT77OCT77/MAR78(ADD) Q
 FEB78/MAY78JUN80/ (ADD) Q
 NOV75/OCT75NOV75/OCT75 M
 FEB76/FEB76APR76/APR76 M
 APR76/MAY77JUN76/SEP77 M
 JUN76/ AUG76/ (DEL) M
 OCT77/OCT77FEB79/JAN79(ADD) M
 MAR78/MAR78JUN80/ M
 MAY80/MAY80JUN80/ M
 JAN77/ FEB77/ (DEL) M
 FEB77/ MAR77/ (DEL) M
 MAR77/ MAY77/ (DEL) M
 APR77/ JUL77/ (DEL) M
 AUG77/ NOV77/ (DEL) M
 OCT77/ NOV77/ (DEL) M
 MAY80/MAY80JUL80/ M
 AUG80/ SEP80/ M
 /SEP76 M
 /SEP76 M
 /JUN78 M
 MAY79/MAY79JUN79/JUN79 M
 JUN79/MAY79JUN79/JUN79 M
 JUL79/JUL79JUL79/JUL79 M
 AUG79/AUG79SEP79/NOV79 M
 OCT79/JAN80OCT79/MAR80 M
 OCT79/AUG79OCT79/MAR80 M
 OCT79/MAR80OCT79/MAR80 M
 NOV79/APR80NOV79/APR80 M
 JAN80/JAN80JAN80/APR80 M
 JAN80/ JAN80/ M
 JAN80/ JAN80/ M
 JAN80/ JAN80/ M
 MAR80/APR80JUN80/ M
 JUL80/ JUL80/ M
 JUL80/ JUL80/ M
 AUG80/ AUG80/ M
 / /JUN76 N
 JUL74/OCT74DEC74/JAN75 N
 OCT74/DEC74JAN75/FEB75 N
 FEB75/FEB75FEB75/OCT75 N
 MAY75/OCT75MAY75/JUL79 N
 SEP75/NOV75NOV75/DEC75 N
 NOV75/DEC75FEB76/MAY77 N
 AUG76/AUG77JUN80/DEC79 N
 /JUN78AUG78/SEP78 M
 SEP78/OCT78DEC78/ M
 DEC78/ JUN79/ M
 JUN79/ SEP79/ M
 SEP79/ FEB80/ M
 MAR80/ APR80/ M
 OCT75/OCT75OCT75/OCT75 N
 JUN75/JUN75OCT75/OCT75 N
 / JAN76/MAR76 N
 FEB76/APR76MAY76/AUG76 N
 MAY76/AUG76OCT76/SEP79 N
 OCT76/ NOV76/ N
 AUG77/AUG77JUN80/ N
 MAY79/MAY79JUN80/ N
 DEC78/DEC78JAN79/MAR79 N
 MAR79/APR79MAR79/FEB80 N
 JUN79/ JAN80/ N
 JUL79/ SEP79/ (DEL) N
 NOV75/NOV75MAR76/APR76 Q
 MAR76/AUG76AUG76/FEB77 Q
 APR76/SEP76NOV76/FEB77 Q

664076	X-RAY TESTS OF SAMPLE LINERS	APR76/SEP76NOV76/FEB77	Q
664076	STATIC BALLISTIC FLASH X-RAY TESTS	APR76/SEP76SEP76/FEB77	Q
664076	COMPOF RESULTS	SEP76/JAN77NOV76/SEP77	Q
664076	INTERIM TECH RPT	JAN78/JUN78MAR78/	(DEL) Q
664077	ANALOG TEXTURE MAPS PROVIDED FY76	OCT76/MAR77DEC76/OCT77	Q
664077	QUANTITATIVE INDICES CHAR	JAN77/JUN77MAR77/OCT77	Q
664077	PROOF EXPERCHAMBER LAIN LINERS	FEB77/FEB77MAY77/MAY77 (ADD)	Q
664077	X-RAY TEST OF ARNOVEL LINERS	NOV76/NOV76JUN77/JUL77 (ADD)	Q
664077	COMPTX TEXTURE STATIC BALLISTIC XRAY RES	APR77/JUL77JUN77/JUN78	Q
664077	PREP PROC PKG FOR PRECLINERS	OCT77/OCT77JAN78/DEC77 (ADD)	Q
664077	AWARD CONT	JUN77/DEC77AUG77/FEB78 (ADD)	Q
664077	PROOF PRECISION LINERS	AUG77/MAR78OCT79/MAY80 (ADD)	Q
664077	X-MAY BALLISTIC TEST OF PRECLINERS	NOV78/DEC78JUL80/	(ADD) Q
664077	IDENT SELOF MFAPROC	APR77/SEP77AUG80/	Q
664077	COMPOF TOP	JAN79/OCT79SEP80/	Q
664077	PREP OF FINAL TECH RPT	JAN79/MAY80OCT80/	Q
663476	RECEIPT OF FUNDS (TASK A)	DEC75/DEC75DEC75/DEC75	M
663476	PLACE CONTRACT FOR FORM STUDIES	OCT75/OCT75JAN76/	(DEL) M
663476	CONDUCT FORM STUDIES	FEB76/ JUL76/	(DEL) M
663476	REDIRECT EFFORT	FEB76/FEB76MAR76/MAR76 (ADD)	M
663476	CONDUCT RECYCLING STUDY	APR76/APR76JUN77/JUN77 (ADD)	M
663476	HALLISTIC TESTS	JUL79/JUL79OCT79/SEP79 (ADD)	M
663476	COMPLETE RECYCLING STUDY	SEP77/SEP77OCT77/NOV78 (ADD)	M
663476	FINAL REPORT	SEP79/SEP79SEP80/	(ADD) M
663476	RECEIPT OF FUNDS (TASK B)	NOV75/NOV75NOV75/NOV75	M
663476	TRANSFUND STOBRI	NOV75/NOV75DEC75/DEC75	M
663476	CHEM SWAG EVAL	DEC75/DEC75FEB76/APR76	M
663476	SINIERING EVAL	DEC75/JAN76MAR76/MAY76	M
663476	HEAT TREAT EVAL	JAN76/FEB76APR76/JUN76	M
663476	HOT ISOSTATIC PRESS EVAL	JAN76/FEB76MAY76/JUN76	M
663476	XMT35 EVAL LOT NO1	FEB76/APR76MAY76/JUN76	M
663476	XMT35 EVAL LOT NO2	MAR76/JUN76AUG76/SEP76	M
663476	DESCRIPTION OF MF	FEB76/APR76DEC76/MAY77	M
663476	FINAL RPT	AUG77/SEP77SEP80/	M
663477	SELECT OPTIMIZ FPROC	JUL76/ AUG76/	(DEL) M
663477	FAB CURE OF EACH ALLOY	SEP76/ NOV76/	(DEL) M
663477	INSPCT TEST CORES	NOV76/ DEC76/	(DEL) M
663477	RECEIVE FUNDS (TASK C)	SEP76/JAN77SEP76/JAN77	M
663477	PLACE CONTRACTS	SEP76/SEP76JUL77/JUL77	M
663477	ACTIVATE ROLLING FACILITY	MAY76/MAY76JUL77/AUG77	M
663477	PRODUCERONS	AUG77/AUG77AUG77/AUG77	M
663477	PRODUCE TAB ALLOY	AUG77/AUG77JAN78/MAR78	M
663477	PLACE CONTRACT FOR FORM STUDY (TASK D)	AUG77/AUG77JAN78/JUN78	M
663477	DEVPROC	JAN78/JUN78OCT78/OCT78	M
663477	FAB PENETRATORS	FEB79/FEB79JUN79/JUN79	M
663477	PREP FINAL RPT FOR STUDY	AUG79/AUG79MAY80/MAY80 (ADD)	M
663477	HALLISTIC TEST	JUN79/ JUN79/	(DEL) M
663478	CONDUCT PROC STUDIES	MAY78/MAY78MAY79/MAY79	M
663478	CONFIRMATORY BALLISTIC STUDY	FEB79/FEB79MAY79/APR79	M
663478	FINAL RPT	JUN79/JUN79AUG80/	M
663478	FINAL RPT-301	OCT78/JUN79AUG80/	M
663479	CASTINGOTS	OCT78/ NOV78/	(DEL) M
663479	FAB PRODUQUANTITY	JAN79/ MAY79/	(DEL) M
663479	PLACE CONTRACT FOR CHIP CYCLE	FEB79/FEB79JUN80/	(ADD) M
663479	CONDUCT CHIP CYCLE EFFORT	JUN80/ JUN81/	(ADD) M
663479	EVAL PRODH HEAT TREAT PROC	JAN80/JAN80JUL80/	(ADD) M
663479	FAB PENETRATORS	NOV80/ DEC80/	(ADD) M
663479	HALLISTIC TEST	FEB81/ FEB81/	(ADD) M
663479	FINAL RPT	MAR81/ APR81/	M
663479	FINAL RPT (301)	JUN81/ JUN81/	M
664076	PREP CONT WORK SCOPE	OCT75/OCT75NOV75/NOV75	Q
673880	FINAL RPT	AUG81/ AUG81/	M
664276	RECEIPT OF FUNDS	OCT75/OCT75OCT75/OCT75	M
664276	AWARD OF CONTRACT	OCT75/OCT75JAN76/MAR76	M
664276	PERFORM STUDIES	JAN76/APR76MAY76/AUG76	M
664276	WELD BANGSON PROJECTILES	APR76/OCT76JAN77/OCT77	M

664276	ESTABNUITPROCEDURE	APR76/APR76DEC76/SEP76	M
664276	BALLISTICTESTS	MAY76/MAY77DEC76/FEB78	M
664276	FINALRPT	DEC77/DEC77MAY79/JUN79	M
667877	PREPENSUSCOPEOFWORK	SEP76/SEP76SEP76/SEP76	M
667877	AWAKUCUNT	FEB77/FEB77JUN77/SEP77	M
667877	CONUSTUY155MMM107PROJ	JUL78/JUN78MAR79/MAY79	M
667877	CONDSTUY155MMM483PROJ	OCT77/OCT77JUL80/	M
667877	FINALRPT	APR78/MAY78MAR80/	M
667877	FINALRTP-301	APR78/MAY78SEP80/	M
667877	FINALTECHRTP	DEC80/ (ADD)	M
668178	FISCALURLIGATION(ROTARYFORGE)	OCT77/JAN78OCT77/JAN78	M
668178	USGNAFAHTOULING	JAN79/FEB79APH79/APR79	M
668178	PROCUREPREFORMS	APR78/APR78AUG78/AUG78	M
668178	CONDUCTFORGINGTRIALS	MAY79/MAY79JUN78/JUN79	M
668178	INSPHITARYFORGTNGS	JUL78/AUG79JUL78/JAN80	M
668178	PREPECUNOMICANAL	JUL78/JAN80AUG78/FEB80	M
668178	WRITELFINALRPT	MAR80/ APR80/	M
668178	CONDUCTSURVEY	OCT77/JAN78DEC77/JAN78	M
668178	SELCOMPFORINBECT	JAN78/JAN78JAN78/JAN78	M
668178	AWAKUCUNTRACTFORINVEST	APR78/APR78SEP78/SEP78	M
668178	CONDUCTINVEST	SEP78/OCT78OCT78/FEB80	M
668178	PREPECUNOMICANAL	NOV78/FEB80DEC78/APR80	M
668178	WRITELFINALRPT	APR80/ MAY80/	M
668178	WRITELFINALRPT(701)	NOV79/MAR80JAN80/JUN80	M
668178	FINALTECHRPT	NOV79/JUN80AUG80/ (ADD)	M
668178	WRITELFINALRPT(701)SC	NOV79/MAR80DEC79/APR80	M
668178	FINALTECHRTP	NOV79/MAR80DEC79/MAY80 (ADD)	M
668278	SELLINETOBESIMULATED	OCT78/DEC78NOV78/DEC78	M
668278	ANALNEWJIREMENTS	NOV78/DEC78DEC78/DEC78	M
668278	DEVSIMULATION	JAN79/JAN79MAR79/ (DEL)	M
668278	DEBUG+TESTCOMPIHERIZEDUSIMUL	NOV79/NOV79JAN80/ (DEL)	M
668278	CALIBOF COMPUTERSIMUL	JAN80/ MAR80/ (DEL)	M
668278	USGONLINE+DATACOLLECT	JUN79/JUN79AUG79/NOV79	M
668278	SELECTSCONDLINETOBESIMUL	MAR80/ MAY80/	M
668278	ANALNEWJIREMENTS	MAY80/ JUL80/	M
668278	DEVSIMUL	JAN80/ MAR80/	M
668278	DEBUG+TESTSIMUL	AUG80/ NOV80/	M
668278	CALIBSI4UL	NOV80/ DEC80/	M
668278	USGONLINE+DATACOLLECT	JUL80/ AUG80/	M
668278	RPT	DEC80/ FEB81/	M
668377	SCALEMODELPROCFNGR(XM791)	MAR77/MAR77MAY77/MAY77	Q
668377	PROVPRUTOPENETUATOR(XM791)	MAY77/MAY77JUN77/JUN77	Q
668377	CHAROPMATS(XM791)	JUN77/JUN77AUG77/FEB79	Q
668377	BALLISTICFVAL(XM791)	JUN77/JUN77AUG77/AUG77	Q
668377	ANAL+INTERIMRPT(XM791)	SEP78/DEC78JUN79/AUG79	Q
668377	INTERIMRPT	MAY78/JUL78JUL78/AUG78	Q
668377	PROCCENG+PROD	AUG78/OCT78FEB79/FEB79	Q
668377	BALLISTICTEST+FVAL	DEC78/JAN79JUL79/JUL79	Q
668377	ANALDATAINTERIMRPT	JUL79/AUG79OCT79/DEC79	Q
668377	FINALRPT	DEC79/DEC79AUG80/ (ADD)	Q
668378	CONPILOTPROD	NOV78/NOV78OCT79/NOV79	Q
668378	PENETCHARACTER	NOV78/DEC78NOV79/DEC79	Q
668378	SMALLSCALEBALLISTICTEST	FEB79/FEB79JAN80/FEB80	Q
668378	BALLISTICTEST+FVAL	AUG79/AUG79JAN80/MAR80	Q
668378	PROJCOMPL	DEC79/DEC79MAR80/	Q
668378	DOFMPINALRPT	DEC79/DEC79AUG80/	Q
668378	DATAANAL	DEC79/DEC79JUL80/	Q
668378	FINALRTP-301	SEP80/	Q
671676	ESTABSCOPPOFCOMT(MOSEOPER)	APR76/APR76APH76/APR76	M
671676	PLACEOFCONT(HITILETSEP)	APR76/MAY76MAY76/JUN76	M
671676	ANALOFTEMPFLOW+VEL	JUN76/AUG76JAN77/MAR77	M
671676	STRESSANALOF SHELL	SEP76/OCT76FEB77/APR78	M
671676	FAILUREANALOF SHELL	OCT76/NOV76FEB77/APR78	M
671676	FINALCUMPROGFCOMTMOSE	MAR77/JAN78MAR77/APR78	M
671676	PREPUPFINALRPT(MOSING)	MAR77/APR78APH77/MAY78	M
671677	PLACEOFCONT(HITILETSEP)	OCT76/FEB77NOV76/APR77	M

671477	HFATHPLINTGSHF/R	OCT76/APR77/MAR77/	(DEL) M
671477	METAL FRACTURE	DEC76/ MAY77/	(DEL) M
671477	OPTICOMPRGSGFOPHILLETSEP	MAY77/ SEP77/	(DEL) M
671477	PREPOMPTFURNITILETSEP	OCT77/ OCT77/	(DEL) M
671477	TOPICHPTONHILLTSEPTECHS	OCT77/APR77OCT77/JAN78	(ADD) M
671477	REFINORFURKEFFORT	/AUG77 /MAY78	(ADD) M
671477	REFINEUMATHMODFORDWG	JUN78/JUN78JUN78/AUG78	(ADD) M
671477	CONFTESTOFMATHMODFORDWG	AUG78/SEP78MAR79/APR79	(ADD) M
671477	PREPOTF INALRPT OFORDGCONF TEST	MAR79/APR79APR79/MAY79	(AUD) M
671479	ESTABLSC OF WORK (NOSEPIERCECABBERS)	/SEP78 /SEP78	(ADD) M
671479	PLACEOF CONT	FEH79/FEH79JUN79/MAY79	(ADD) M
671479	CONFTESTOFMATHMODFORDUSING	JUL79/JUN79JUL80/	(ADD) M
671479	DEVOPMATHMODFORPIERCECABB+BLOCK	JUL79/JUL79AUG80/	(ADD) M
671479	CONFTESTOFMATHMODFORPIERCECABB+BLOCK	JAN80/MAY80SEP80/	(ADD) M
671479	ANALDATA	SEPR80/ OCT80/	(ADD) M
671479	PREPOTF INALRPT	OCT80/ NOV80/	(ADD) M
672578	PHIINST RUINERTYAWELD	SEP78/OCT78DEC78/MAY79	Q
672578	MEASUPPLETWELENDARA	DEC78/APR79JUN79/APR80	Q
672578	ACQUISYSTCRTLHWR	JUN79/AUG79SEP79/FEH80	Q
672578	DEVSTWRFGRADINTMACHCNTL	SEP79/FEH80FEH80/MAR80	Q
672578	FINALRPT	MAR80/MAY80 AUG80/	Q
672578	PREPPOCPKS	JAN78/JAN78MAY78/AUG78	Q
672578	ANALRPT OF THACT	JUN78/JUN78AUG78/SEP78	Q
673476	SELONGU OFVMUNITICNSPROJ	SEP76/SEP76OCT76/OCT76	M
673476	SELRELGOCONFGRS	OCT76/OCT76NOV76/NOV76	M
673476	INVTSTATSELGOCONFAC	NOV76/NOV76DEC76/DEC76	M
673476	DETCRITITENS+THEIRIMPACT	APR78/APR78MAY78/MAY78	M
673478	DEVBASELCCOMPUTERPROG	MAY78/MAY78SEP78/SEP78	M
673478	DEV+TESTNIMCNTL TOOL+SPAREPTSPROG	AUG78/AUG78NOV78/NOV78	M
673479	PREPPOCCOVERCTNPROCEDURES	DEC78/FEH79JUN79/JUN79	(ADD) M
673479	PREPPOCCOMPDOC	MAY79/APR79SEP80/	(ADD) M
673479	PREPPT	JUL79/JUL79SEP80/	(ADD) M
673480	DATABASLSTRUCT	OCT80/ JAN81/	M
673480	INFUI/OUTPUTFORMATS	NOV80/ FEH81/	M
673480	DEFMATRICES	JAN81/ MAR81/	M
673480	USENUATBASESYS	OCT80/ JUL81/	M
673480	DOC	JUN81/ SEP81/	M
673480	DEMOAFIALRPT	AUG81/ OCT81/	M
673479	RCPTOFFUNDS	OCT78/OCT78OCT78/OCT78	M
673479	PLACECUITRACTPIASMAAC	DEC78/DEC78APR79/MAY79	M
673479	PLACECUITRACTMACHEVAL	MAR79/MAY79JUL79/NOV79	M
673479	CONDMACHSTUDIES	JUL79/DEC79SEP80/	M
673479	PREPSPEC	JAN80/ JUN80/	M
673479	FINALRPT	JUN80/ SEP80/	M
673480	PLACECUIT	MAY80/MAY80NOV80/	M
673480	CONDUCTMACHSTUDIES	DEC80/ MAR81/	M
673480	FINALTECHPT	MAR81/ JUL81/	M
675476	RCPTOFFUNDS	MAY76/MAY76MAY76/MAY76	M
675476	RCPTOFFUNDS	JUL77/NOV77JUL77/NOV77	(ADD) M
675476	PLACECUIT/NORPISINDUST	MAY76/JAN78JUN76/FEH78	M
675476	RCPTOOL	JUN76/AUG78AUG76/AUG78	M
675476	TOCLTRY OUT	JUL76/OCT78AUG76/NOV78	M
675476	FORGE+LISPCTPTS	AUG76/NOV78AUG76/NOV78	M
675476	FINISHFUND+MACHPTS	SEP76/ DEC76/	(DEL) M
675476	FINALINSPCTPTS	JAN77/ JAN77/	(DEL) M
675476	PREPFINALRPT	JAN77/DEC77MAY78/DEC79	M

SAMPLE OF HOW MILESTONE DATA IS EXTRACTED FROM THE MILESTONE DATA BASE PROGRAM FOR NOV 79

1240=400078	AWARDCONTRACT(PHASE3)	NOV79/	(DEL)
1440=400080	FINALREPORT	AUG79/ NOV79/	(DEL)
2340=401275	PREPPRELIMDSGNCRITERIA	JAN79/JAN79NOV79/	(ADD)
2360=401275	HAZARDSANALYSIS	FEB76/FEB76NOV79/	
3480=405179	EVALOFINSTRUMENTATION	SEP79/ NOV79/	
4020=405474	SHIPMACHTOARRADCOM	NOV79/ NOV79/	(ADD)
6360=411473THRU76	DSGNPROCINSTALLREVEQUIP	DEC77/DEC77NOV79/	(ADD)
9200=411475	RFT	OCT78/OCT78NOV79/	(ADD)
10560=411476	EVALOFSULFIDEMONITOR	MAR76/MAR76NOV79/	(ADD)
10580=411476	EVALOFTOTCARBONMONITOR	MAR76/MAR76NOV79/	(ADD)
13380=416379	EXECUTIONOFTTESTPLN	JUN79/JUN79NOV79/	
13400=416379	FIRINGTEST(PROVGRD)	OCT79/ NOV79/	
14480=421177	INSTALLPROTOCNTLSYSTFOREVAL	DEC78/DEC78NOV79/	
15060=421478	FINALRPTRECSCHOFPROPPEUSEMEAS	OCT79/ NOV79/	
15580=421479	FINALRPT	AUG79/ NOV79/	
15620=421479	TEST+EVAL	AUG79/ NOV79/	
15720=421479	ENGRREVIEW	SEP79/SEP79NOV79/	(ADD)
16180=421574	PROTOCNTLSYSTACCPD	JUN77/JUN77NOV79/	
18080=425277	PILOTPLANTREACTVAROPT	JUN79/ NOV79/	(DEL)
18140=425278	PRODSIMMERPROC	MAR79/MAR79NOV79/	(DEL)
18220=425278	PILOTPLANTPREPOFSTDHMXBATCH	OCT79/ NOV79/	(ADD)
20380=428179	SURVEYGASUSAGEATRAAP	AUG79/ NOV79/	
21260=428579	TEST+EVAL	FEB79/FEB79NOV79/	(ADD)

21280=428579	GEOMETRIEFFECTS	FEB79/FEB79NOV79/	(ADD)
23040=431078	FINALRPT	SEP79/ NOV79/	
23060=431079	EVAL+OPTOFFPROC	SEP79/ NOV79/	(ADD)
23080=431079	PROVEOUTCONTENDURRUNS	OCT79/ NOV79/	(ADD)
23460=431177	SHIPTOLOADPLANT	JAN79/JAN79NOV79/	
23760=432279	INTERIMRPTI, FY78EFFORT	JUN79/JUN79NOV79/	
24820=433776	GATORINSITUBONDING	AUG79/AUG79NOV79/	(ADD)
25200=433676	PROTO DSGNCOMPL	MAY79/ NOV79/	
28200=446678	MODAUTOMELTSYST	OCT79/ NOV79/	
28260=446678	PILOTLINETEST	OCT79/ NOV79/	
28780=446980	RECVDFUNDS	NOV79/ NOV79/	(ADD)
29500=450878	HAZARDAHAL	MAY79/MAY79NOV79/	(ADD)
30600=655379	PREFORMPRODINETST	NOV79/ NOV79/	
33100=668178	INSPRITARYFORGINGS	JUL79/AUG79NOV79/	
33220=668178	CONDUCTINVEST	SEP78/OCT78NOV79/	
33380=668278	DSGNLINE+DATACOLLECT	JUN79/JUN79NOV79/	
33740=668378	PENETCHARACTER	NOV78/DEC78NOV79/	
34220=671679	CONFTESTOFMATHMODFORMOSING	JUL79/ NOV79/	(ADD)
34340=672578	MEASOFFPERTWELDPARA	APR79/APR79NOV79/	
34880=675976	PREPFINALRPT	DEC78/DEC78NOV79/	

SAMPLE OF HOW MILESTONE DATA IS EXTRACTED FROM THE MILESTONE DATA BASE PROGRAM FOR NOV 79

2920=404178	TESTPROTOSTASATMAAP	NOV79/	JAN80/	(ADD)
3500=405179	DOC+FINALRPT	NOV79/	DEC79/	
4020=405474	SHIPMACHTOARRADCOM	NOV79/	NOV79/	(ADD)
12040=412479	TOOL+FIXTURESPECS	NOV79/		
13420=416379	PRODPROCDSGNS	NOV79/	DEC79/	
15280=421479	PROCPILOTPLANTFAC(RAAP)	NOV79/	JAN80/	(ADD)
15520=421479	HAZARDANAL	NOV79/	FEB80/	
15740=421479	INVESTIGATESTDYS	NOV79/	JUN80/	(ADD)
15940=421479	TSTOFEQUIP&MATL(BAAP)	NOV79/	SEP80/	(ADD)
16600=422377	FABPROPCHGS	NOV79/	DEC79/	
18260=425278	PILOTPLANTPROCVARSTDYFORHMX	NOV79/	MAR80/	(ADD)
20300=428179	SELOFINSULTYPE+APPL	NOV79/	JAN80/	
20420=428179	EVALCOALGASFORUSEINRAAPPROC	NOV79/	MAY80/	
20480=428179	HAZARDSANAL	NOV79/	APR80/	
23100=431079	PRODINCORP	NOV79/	JAN80/	(ADD)
23120=431079	PHY+CHEMTESTSOFFPROD	NOV79/	FEB80/	(ADD)
23580=431279	HAZARDSANALYSIS	NOV79/	JUL80/	
24120=433579	FABPROCTOOLING	NOV79/		
27400=444978	PROCEVAL	NOV79/	APR80/	(DEL)

28280=446678	TECHRPT(INTERIM)	NOV79/	DEC79/	
28340=446679	HAZARDSANALYSIS	NOV79/	JUN80/	
28780=446980	RECVDFUNDS	NOV79/	NOV79/	(ADD)
28800=446980	BUILDSYSTPROTO(DUAL)	NOV79/	MAY80/	(DEL)
29100=447479	LAB/BENCHSCALESTDY	NOV79/	JUL80/	
29120=447479	HAZARDAHL	NOV79/	JUL80/	
29220=448179,80	PURCHASEEQUIP	NOV79/	MAR80/	
30600=655379	PREFORMPRODLINETST	NOV79/	NOV79/	
33140=668178	WRITEFINALRPT	NOV79/	JAN80/	
33340=668278	DEBUG+TESTCOMPUTERIZEDSIMUL	NOV79/	JAN80/	
35000=678178	WRITEFINALRPT	NOV79/	JAN80/	
35120=678178	WRITEFINALRPT	NOV79/	DEC79/	

SAMPLE OF HOW MILESTONE DATA IS EXTRACTED FROM THE MILESTONE DATA BASE PROGRAM FOR DEC 79

2380=401275	GUNFIRINGS	DEC79/	DEC79/	
3380=405075	DELIVERYINSTALL+PROVEPROTOEQUIPATLP	DEC79/	JUN80/	
3400=405075	FINALIZETECHDATAPKG	DEC79/	JUN80/	
4120=405979	INSTALLATION	DEC79/	JAN80/	
4420=406479	SAFETYTESTSYSTEM	DEC79/	AUG80/	
9360=411475	HAZARDSANAL+ONLINEEVAL	DEC79/	MAR80/	(ADD)
10100=411476	EVALOFREVPROC	DEC79/	FEB80/	(ADD)
10220=411476	FINALRPT	DEC79/	APR80/	(ADD)
12060=412479	PROGRAMMING	DEC79/		
13440=416379	FINALRPTARRADCOM	DEC79/	JAN80/	
13600=4194	PROC/FABOFTSTEQUIP	DEC79/	AUG79JUL80/	
15420=421479	QUALQUANTPOLLABATEDWATERS	DEC79/	MAR80/	(ADD)
15640=421479	FINALRPT	DEC79/	MAR80/	
16640=422377	ECOANAL	DEC79/	JAN80/	
16780=422579	ADAPTATIONSTUDIES	DEC79/	AUG80/	
18100=425277	FINALRPT(FY77EFFORT)	DEC79/	JAN80/	
22460=429179	TEST	DEC79/	APR79/	
22480=429179	TESTEVAL	DEC79/	JUN80/	
24000=433279	SAMPLEFAB	DEC79/	JAN79/	
24140=433579	MFRSAMPLEHARDWARE	DEC79/		
26940=444478	PREPOFCONTRDWG	DEC79/		
27800=446079	HAZARDSANAL	DEC79/	NOV80/	
28740=446979	DEBUG+EVALCONCEPTMODELS	DEC79/	JAN80/	(ADD)
32660=603479	CONDUCTCHIPRECYCLEEFFORT	DEC79/	OCT80/	(ADD)
33240=608178	PREPECONOMICANAL	DEC79/	JAN80/	
33800=668378	PROJCOMPL	DEC79/	MAR80/	
33820=668378	DOHFINALRPT	DEC79/	APR80/	

SAMPLE OF HOW MILESTONE DATA IS EXTRACTED FROM THE MILESTONE DATA BASE PROGRAM FOR DEC 79

1080=400077	MONITORMULTITOOLLOADERPROG	JUL77/JUL77DEC79/	(ADD)
1280=400078	ASSEMTEST+MODIFY	SEP79/ DEC79/	(DEL)
2380=401275	GUNFIRINGS	DEC79/ DEC79/	
3500=405179	DOC+FINALRPT	NOV79/ DEC79/	
4100=405979	EQUIPMOD	SEP79/ DEC79/	
8820=411475,76	PILOTPLANTINSTALL+EVAL	OCT77/NOV77DEC79/	(ADD)
11780=411477	IMPLPROG	SEP77/AUG78DEC79/	
13420=416379	PRODPROCDSGNS	NOV79/ DEC79/	
14500=421177	COMPL+EVALDATAFROMLINEPROCNTLOPER	SEP79/ DEC79/	
15400=421479	ETABPROCWATERSPECSQUAL+QUANT(KAAP)	AUG79/AUG79DEC79/	(ADD)
15500=421479	TEST+EVALSTUDIESANAL+ECOEVALDATA	OCT79/ DEC79/	
16060=421478	FINALRPT	OCT79/ DEC79/	(ADD)
16200=421574	TDPCMPL	JAN79/JAN79DEC79/	
16600=422377	FABPROPCHGS	NOV79/ DEC79/	
17460=423778	FINALRPT+HAZARDSANAL	MAR79/MAR79DEC79/	(ADD)
17740=424978	PILOTPLANTOPER	JUL79/ DEC79/	(DEL)
17760=424978	ECOEVAL	AUG79/ DEC79/	(DEL)
18700=4267 77,78	HAZARDSANAL	JAN79/FEB79DEC79/	
19140=428077	FINALRPT	SEP79/ DEC79/	(ADD)
19780=428177	PREPFINALRPT	APR79/APR79DEC79/	
21060=428577	REPORTPREP+DISTRIBUTION	FEB77/AUG77DEC79/	
22420=429179	ANALYTICALSTUDIES	JUN79/JUN79DEC79/	

22440=429179	TESTPLANDEV	SEP79/	DEC79/	
22540=430979	ENGRREV&GENPROCSTDY	JUL79/JUL79	DEC79/	
23980=433279	INVESTIGATEALTERNATIVES	SEP79/	DEC79/	
26060=436277	FINALRPT	JUL79/JUL79	DEC79/	
26760=444479	LAPPROJS	OCT79/	DEC79/	
27160=444778	RPT	SEP79/	DEC79/	
27260=444978	FINALRPT(2TESTLOTS)	OCT79/	DEC79/	
27440=444978	FINALRPT	OCT79/	DEC79/	
27520=444978	FINALRPT(ADDTTESTLOTS)	OCT79/	DEC79/	(ADD)
27920=446278	ENGRSTDYS	SEP78/SEP78	DEC79/	
27940=446278	HAZARDANALII	SEP78/SEP78	DEC79/	
28000=446278	PROCNGSCRUBBERTANKS+PUMPS	FEB79/FEB79	DEC79/	
28020=446278	SUBMITABSORBERDSGN+DWGS	MAY79/MAY79	DEC79/	
28280=446678	TECHRPT(INTERIM)	NOV79/	DEC79/	
28720=446979	DSGN+BUILDCONCEPTMODELS	SEP79/	DEC79/	(ADD)
29040=447278	PREPARESCOPEOFWORK	FEB79/FEB79	DEC79/	
29520=450878,79	PILOTPLANTDSGNCRIT+DSGN	JAN79/JAN79	DEC79/	
29540=450878	FINALRPTFY78	OCT79/	DEC79/	
30080=621175	TECHRPT(HCCCPROC)	FEB78/MAY78	DEC79/	(ADD)
31160=657174	FINALRPT	OCT78/NOV78	DEC79/	(ADD)
31440=662876	TDP	AUG77/AUG77	DEC79/	
31460=662876	FINALRPT	MAY79/MAY79	DEC79/	
31860=664077	X-RAY+BALLISTICTESTOFFPRECLINERS	NOV78/DEC78	DEC79/	(ADD)
32640=663479	PLACECONTRACTFORCHIPRECYCLE	FEB79/FEB79	DEC79/	(ADD)
34360=672578	ACQUISYSTCNTLHDWR	JUN79/AUG79	DEC79/	
35120=678178	WRITEFINALRPT	NOV79/	DEC79/	

*****FY 79MMT PROGRAM*****

PROJ TOTAL AMTH		IN HOUSE		CONTRACT			GOCO			OGA		
		COMM	OBLIG	COMM	OBLIG	DATE	COMM	OBLIG	DATE	COMM	OBLIG	DATE
4000	1614000	1249000	1249000	0	0		365000	365000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP							
4024	1132000	111000	111000	1021000	1021000		0	0 0		0	0	
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPIS							
4046	307000	237000	237000	0	0 0		70000	70000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP							
4051	157000	157000	157000	0	0 0		0	0 0		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL							
4059	250000	25000	25000	0	0 0		225000	225000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL							
4062	907000	191000	191000	305000	0 9/30/80		11000	11000 0		0	0	
% OBLIG	#	39.8	DIVISION IS ESP	TECH AREA IS	LAP							
4064	1262000	1026000	1026000	195000	195000		41000	41000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP							
4084	121000	96000	96000	0	0 0		25000	25000 0		0	0	
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	POLLUTION							
4124	930000	132000	132000	798000	798000		0	0 0		0	0	
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPIS							
4137	205000	114000	114000	85000	85000		6000	6000 0		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP							
4163	661000	399000	399000	0	0 0		262000	262000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP							
4189	533000	58000	58000	375000	375000		0	0 0 0		100000	100000 0	
% OBLIG	#	36.7	DIVISION IS MSD	TECH AREA IS	MPIS							
4194	327000	311000	311000	0	0 0		16000	16000 0		0	0 0	
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	PROP+EXPL							
4214	1269000	716000	716000	20000	20000		533000	533000		0	0	
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	POLLUTION							

4225	350000	120000	120000	0	0 0	230000	230000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	POLLUTION				
4263	329000	304000	304000	25000	25000	0	00 0	0	00
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	LAP				
4281	1345000	572000	572000	0	0	773000	773000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	ENERGY				
4285	420000	285000	285000	0	0 0	0	0 0	135000	135000
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4288	643000	633000	633000	0	0 0	10000	10000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4291	235000	155000	155000	80000	80000	0	0 0	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4309	848000	384000	384000	0	0 0	464000	464000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4310	483000	189000	189000	0	0 0	294000	294000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4312	261000	80000	80000	0	0 0	181000	181000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	LAP				
4322	609000	410000	410000	0	0 0	199000	199000	0	0
% OBLIG	=	100.0	DIVISION IS ASD	TECH AREA IS	MPIS				
4332	83000	5000	5000	78000	78000	0	0 0	0	0
% OBLIG	=	100.0	DIVISION IS MSD	TECH AREA IS	MPIS				
4335	411000	111000	111000	300000	300000	0	0 0	0	0
% OBLIG	=	100.0	DIVISION IS MSD	TECH AREA IS	MPIS				
4341	742000	136000	136000	0	0 0	606000	606000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4444	355100	295000	295000	37000	0 4/30/80	23100	23100	0	0
% OBLIG	=	89.6	DIVISION IS MSD	TECH AREA IS	MPIS				
4460	236000	122000	122000	0	0 0	114000	114000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4462	528000	132000	132000	0	0 0	396000	396000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				

4466	461000	371000	371000	90000	90000	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4469	1150000	279000	279000	871000	871000	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	LAP				
4474	175000	75000	75000	0	0 0	100000	100000	0	00
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	ENERGY				
4498	1147000	88000	88000	4000	4000	1055000	1055000	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	LAP				
4508	357000	68000	68000	0	0 0	289000	289000	0	0
% OBLIG	#	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
6553	95000	67000	67000	28000	28000	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
6634	942000	242000	242000	300000	0 5/30/80	0	0 0	0	0
% OBLIG	#	44.6	DIVISION IS MSD	TECH AREA IS	MPTS				
6682	170000	170000	170000	0	0 0	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
6683	146000	146000	146000	0	0	0	0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
6716	306000	36000	36000	270000	270000 0	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
6736	256000	81000	81000	175000	175000	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
6738	181000	132000	132000	49000	49000 0	0	0 0	0	0
% OBLIG	#	100.0	DIVISION IS MSD	TECH AREA IS	MPTS				
TOTALS	22139100	10510000	10510000	5106000	4146500	6288100	6288100	235000	235000

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DIVISIONS												
ASD			NFD			ESP			MSD			
COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	
410000	410000	100.0	0	0	-1	8019000	8019000	100.0	2081000	2081000	100.0	IN HOUSE
199000	199000	100.0	0	0	-1	4970000	4970000	100.0	1119100	1119100	100.0	GOCO
0	0	-1	0	0	-1	1671000	1366000	81.7	3435000	2760500	80.4	CONTRACTS

0	0	-1	0	0	-1	135000	135000	100.0	400000	100000	100.0	OGA
609000	609000	100.0	0	0	-1	14795000	14490000	97.9	6135100	6060600	90.0	TOTAL

TECH AREAS

IN HOUSE			CONTRACTS			GOCO			OGA		
COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG
3967000	3967000	100.0	1485000	1180000	79.5	1991000	1991000	100.0	0	0	-1
1996000	1996000	100.0	3431000	2756500	80.3	222100	222100	100.0	400000	100000	100.0
932000	20000	2.1	20000	20000	100.0	788000	788000	100.0	0	0	-1
1073000	1073000	100.0	80000	80000	100.0	10000	10000	100.0	135000	135000	100.0
1895000	1895000	100.0	90000	90000	100.0	2404000	2404000	100.0	0	0	-1
0	0	-1	0	0	-1	0	0	-1	0	0	-1
647000	647000	100.0	0	0	-1	873000	873000	100.0	0	0	-1
TOTAL % OBLIG.=						95.6	TOTAL % OBLIG.			21159600	

TOTAL % OBLIG

CONTRACT= 80.8

GOCO =100.0

OGA = 100.0

TOTAL % TO BE OBLIGATED BY:

MONTH	CONTRACT	GOCO	OGA	TOTAL
JAN	0	0	0	0
FEB	0	0	0	0
MAR	0	0	0	0
APR	37000	0	0	37000
MAY	300000	0	0	300000
JUNE	0	0	0	0
JULY	0	0	0	0
AUG	0	0	0	0
SEPT	305000	0	0	305000
OCT	0	0	0	0
NOV	0	0	0	0
DEC	0	0	0	0

***** A POINT SPECIFIED IN A CALL TO PLOT LIES OUTSIDE THE PLOTTING AREA. PEN MOVEMENT TERMINATED AT BOUNDARY

TOTAL \$ TO BE CARRIED OVER TO FY 80:

MONTH	CONTRACT	GOCO	OGA	TOTAL
JAN	0	0	0	0
FEB	0	0	0	0
MAR	0	0	0	0
APR	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	0	0	0
AUG	0	0	0	0
SEPT	0	0	0	0
OCT	0	0	0	0
NOV	0	0	0	0
DEC	0	0	0	0

PROJ	TOTAL AUTH	IN HOUSE		CONTRACT			GOCO			OGA		
		COMM	OBLIG	COMM	OBLIG	DATE	COMM	OBLIG	DATE	COMM	OBLIG	DATE
4000	250000	230000	230000	0	0 0		20000	20000		0	0 0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS LAP								
4033	153000	153000	153000	0	0		0	0		0	0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS PROP+EXPL								
4037	236000	30000	30000	0	0 0		206000	206000		0	0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS PROP+EXPL								
4061	260000	63000	63000	0	0 0		197000	197000		0	0 0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS PROP+EXPL								
4062	884000	9000	9000	875000	0 9/30/80		0	0 0		0	0 0	
% OBLIG =	1.0	DIVISION IS ESP		TECH AREA IS LAP								
4084	111000	111000	111000	0	0 0		0	0 0		0	0 0	
% OBLIG =	100.0	DIVISION IS MSD		TECH AREA IS PROP+EXPL								
4137	67000	67000	67000	0	0		0	0 0		0	0 0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS LAP								
4189	1248000	404000	404000	0	0 0		644000	0 9/30/80		200000	0 9/30/80	
% OBLIG =	32.4	DIVISION IS MSD		TECH AREA IS MPTS								
4200	29000	29000	29000	0	0		0	0		0	0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS PROP+EXPL								
4210	450000	112000	112000	0	0		338000	338000		0	0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS PROP+EXPL								
4225	155000	84000	84000	0	0 0		71000	71000		0	0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS POLLUTION								
4226	100000	50000	50000	0	0 0		50000	0 8/30/80		0	0 0	
% OBLIG =	50.0	DIVISION IS ESP		TECH AREA IS POLLUTION								
4231	250000	88000	88000	0	0 0		162000	162000		0	00 0	
% OBLIG =	100.0	DIVISION IS ESP		TECH AREA IS POLLUTION								
4236	612000	130000	130000	459000	0 9/30/80		23000	23000		0	0 0 0 0	
% OBLIG =	21.6	DIVISION IS ESP		TECH AREA IS LAP								

4266	345000	345000	345000	0	08	0	00	0	00 0
% OBLIG	=	100.0	DIVISION IS NFD	TECH AREA IS	FUZE				
4281	1234000	315000	315000	0	0 0	919000	660000	7/30/80	0 0
% OBLIG	=	79.0	DIVISION IS ESP	TECH AREA IS	ENERGY				
4285	408000	408000	408000	0	0 0	0	0 0	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4288	767000	767000	767000	0	0	0	0 0	0	0 0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4291	100000	100000	100000	0	0	0	0	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	SAFETY				
4309	3726000	347000	347000	2396000	0 9/30/80	983000	0 7/30/80	0	0
% OBLIG	=	9.3	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4310	278000	278000	278000	0	0	0	0	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4312	279000	153000	153000	0	0 0	126000	126000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	LAP				
4322	502000	257000	257000	8000	0 1/30/80	237000	175000	8/30/80	0 0
% OBLIG	=	86.1	DIVISION IS ASD	TECH AREA IS	MPIS				
4341	583000	170000	170000	0	0 0	413000	0 7/30/80	0	0
% OBLIG	=	29.2	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4462	850000	341000	341000	0	0	509000	509000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
4469	350000	225000	225000	0	0	125000	125000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	LAP				
4498	392000	110000	110000	182000	0 9/30/80	100000	100000	0	0
% OBLIG	=	53.6	DIVISION IS MSD	TECH AREA IS	LAP				
4508	506000	172000	172000	0	0 0	334000	334000	0	0
% OBLIG	=	100.0	DIVISION IS ESP	TECH AREA IS	PROP+EXPL				
6736	340000	155000	155000	160000	009/30/80	0	0	25000	0 7/31/80
% OBLIG	=	45.6	DIVISION IS MSD	TECH AREA IS	MPIS				
6738	297000	117000	117000	180000	0 9/31/80	0	0	0	0
% OBLIG	=	39.4	DIVISION IS MSD	TECH AREA IS	MPIS				

TOTALS 15762000 5820000 5820000 4260000 0 5457000 3025300 225000 0

DIVISIONS

ASD			NFD			ESP			MSD			
COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	
257000	257000	100.0	345000	345000	100.0	4321000	4321000	100.0	897000	897000	100.0	IN HOUSE
237000	175000	73.8	0	0	-I	4476000	2750300	61.4	744000	100000	13.4	GOCO
8000	0	0.0	0	0	-I	3730000	0	0.0	522000	0	0.0	CONTRACTS
0	0	-I	0	0	-I	0	0	-I	425000	0	0.0	OGA
502000	432000	86.1	345000	345000	100.0	12527000	7071300	56.4	2388000	997000	41.8	TOTAL

TECH AREAS

IN HOUSE			CONTRACTS			GOCO			OGA			
COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	COMM	OBLIG	%OBLIG	
924000	924000	100.0	1516000	0	0.0	394000	373300	94.7	0	0	-I	LAP
933000	933000	100.0	348000	0	0.0	881000	175000	19.9	225000	0	0.0	MPTS
222000	0	0.0	0	0	-I	283000	233000	82.3	0	0	-I	POLLUTION
1275000	1275000	100.0	0	0	-I	0	0	-I	0	0	-I	SAFETY
1806000	1806000	100.0	2396000	0	0.0	2980000	1584000	53.2	0	0	-I	PROP+EXP
345000	345000	100.0	0	0	-I	0	0	-I	0	0	-I	FUZE
315000	315000	100.0	0	0	-I	919000	660000	71.8	0	0	-I	ENERGY

TOTAL % OBLIG.= 56.1 TOTAL \$ OBLIG. 8845300

TOTAL \$ OBLIG

CONTRACT= 0.0

GOCO = 55.4

OGA = 0.0

TOTAL \$ TO BE OBLIGATED BY:

MONTH	CONTRACT	GOCO	OGA	TOTAL
JAN	0	0	0	0
FEB	0	0	0	0
MAR	0	0	0	0
APR	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	8000	1655000	25000	1688000
AUG	0	112000	0	112000
SEPT	4252000	644000	200000	5096000
OCT	0	0	0	0
NOV	0	0	0	0
DEC	0	0	0	0

***** A POINT SPECIFIED IN A CALL TO PLOT LIES OUTSIDE THE PLOTTING AREA. PEN MOVEMENT TERMINATED AT BOUNDARY

TOTAL \$ TO BE CARRIED OVER TO FY 81:

MONTH	CONTRACT	GOCO	OGA	TOTAL
JAN	0	0	0	0
FEB	0	0	0	0
MAR	0	0	0	0
APR	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	0	0	0
AUG	0	0	0	0
SEPT	0	0	0	0
OCT	0	0	0	0
NOV	0	0	0	0
DEC	0	0	0	0

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