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RESTRICTED DATA

ATOMIC ENERGY ACT-1954

PROJECT HISTORY
of
LINE I OPERATIONS
Contract W-49-010-ORD-68

at

IOWA ORDNANCE PLANT
1 July - 31 December 1954

OPERATING CONTRACTOR

MASON & HANGER-SILAS MASON CO., INC.

ENGINEERS AND CONTRACTORS

BURLINGTON, IOWA

Approved by:

Joel C. Holmes
Plant Manager

Russell G. Cone
Vice President

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Safety Department

COMPLETED: APRIL 1955

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INTRODUCTION

The Mason & Hanger-Silas Mason Co., Inc. has attempted in this historical summary to briefly record the activities for the period July 1 through December 31, 1954, under Contract W-49-010-ORD-68. Prior to this merger date, March 1, 1955, the work was done by the Silas Mason Company, Incorporated. There was no change in personnel or management in this work occasioned by the merger.

The MK 7 and Cobra Mod. 0 Programs completed, production of the Cobra 1 was initiated, and production of the MK 12 continued throughout the period of this report. Metal parts for both the MK 12 and Cobra 1 were in short supply necessitating storage of large quantities of both cased and uncased high explosive spheres. In spite of these difficulties, the intra-plant delivery of H.E. components was maintained on schedule.

Notwithstanding the extra handling, transporting, and storage of high explosives, the organization maintained a consistent trend of producing high quality products at decreasing costs. An accident frequency and severity rating of 0.00 was attained for the 377,122 man-hours worked.

1.000 ORDNANCE ADMINISTRATION

Duty assignment and the number of military personnel remained unchanged during the period covered by this report.

Department of the Army civilian personnel totalled 13 throughout the reporting period, without change in organization.

A complete Standard Operating Procedures Manual, covering Ordnance employee activities in connection with administration of Contract W-49-010-ORD-68, Division "B", was published.

2.000 CONTRACTOR ADMINISTRATION

2.100 CHANGES TO CONTRACT NO. W-49-010-ORD-68

Supplement No. 12 to subject contract was issued effective 30 September 1954. This supplement covered a revision of estimated costs, additional operation of facilities through 30 September 1955, and modifications to the following contractual provisions: (1) reimbursement of Contractor's expenditures for travel and transportation of employees, their families, and household effects, (2) reimbursement of Contractor's expenditures for maintenance of required records, (3) maintenance of records, (4) disputes, and (5) renegotiation.

2.200 MANUAL OF STANDARD PRACTICES

The Purchasing Section (2.000 to 2.201) of the Manual of Standard Practices was revised in accordance with Ordnance Ammunition Command Circular 27-54, dated 15 June 1954, and copies were distributed to all holders of the Standard Practices books.

2.300 KEY PERSONNEL CHANGES

The only changes in key personnel took place in the Fiscal and Services Division. Mr. G. A. Walter, Supervisor of Services, was transferred to the Green River Ordnance Plant operations, a

sub-installation of the Iowa Ordnance Plant, Contract DA-11-173-CMD-85, on 26 July 1954. Mr. O. F. Kemp, former Traffic Manager, became Chief of Services on 12 July 1954. Concurrently, Mr. H. J. DeLashmutt, Chief Investigator, reported directly to the Division Manager. These changes are reflected on "Key Personnel" and "Organization Chart" which follow this page.

SILAS MASON COMPANY
IOWA ORDNANCE PLANT
KEY PERSONNEL

HOME OFFICE

R. L. Telford	1st Vice President, Silas Mason Co.
R. G. Cone	Vice President & General Manager, Silas Mason Co.
R. T. Buffington	Comptroller, Silas Mason Co.
R. B. Jewell	Vice President & Chief Engineer, Silas Mason Co.

CONTRACT W-49-010-ORD-68

J. G. Holmes	Plant Manager
A. W. Boyd	Administrative Assistant
P. D. Holliday	Division Manager, Division "B"
J. W. Routh	Division Engineer
D. E. Heffelbower	Engineer
L. R. Rothstein, Ph.D.	Chief Chemist
L. F. Rutherford	Reproduction Department Supervisor
N. M. Riddick	Master Mechanic
R. B. Carroll	Production Manager
W. M. Macfarlane	Production Superintendent, Plant "C"
E. R. Harrell	Production Superintendent, Plant "D"
O. E. Erickson	Production Control Superintendent
J. M. Higgins	Division Manager, Safety & Security
O. W. Graham	Chief Safety Inspector
L. J. Grier	Fire Chief
J. H. Nestle	Guard Chief
B. A. James	Division Manager, Fiscal & Services
D. L. Fimmen	Personnel Manager
M. J. Latimer, M.D.	Medical Director
O. F. Kemp	Chief of Services
R. S. Ramsey	Purchasing Agent
P. H. Hessing	Chief Accountant
R. P. Johnson	Chief Storekeeper
E. J. Kuntz	Paymaster
E. D. Elmore	Chief Timekeeper
H. J. DeLashmutt	Chief Investigator
J. P. Smith	Data Center Supervisor

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3.101 DESIGN AND MAINTENANCE

This Engineering Section is responsible for the design of new equipment, tooling, machines, and buildings. The Section also is responsible for direct engineer liaison with the Maintenance Department, as well as the coordination of maintenance activities with respect to schedules and projected operations.

Major design and equipment changes accomplished during the the reportable period include:

1. Safety controls on refrigeration compressors. Bearing failure was encountered on several refrigeration compressors due to faulty lubrication. This was traced to liquid Freon in the compressor crankcase. Low head pressure cutout switches have been installed to control evaporative condenser fans which in turn increase the discharge pressure of the compressor. With a fixed pressure drop across th expansion valves and cooling coils, a higher discharge pressure will result in a higher suction pressure. The Freon returning to the compressor will be in a gaseous rather then a liquid state. Considerable benefits of maintenance and repair costs will result.

2. Reduction of air flow in operating buildings. Air flow has been reduced in several operating buildings resulting in savings on fuel and electrical costs. Air flows have been reduced by 50% in some locations while still maintaining ventilating rates consistent with good practice and in compliance with existing codes.

3. Consolidation of battery charging station with the Electric Shop. The battery charging station was moved from Building 1-16 to Building 1-01 and consolidated with the Electric Shop. This improves the efficiency of the Electric Shop since their shop work can now be accomplished in one location.

4. Steam distribution to Lines II and III. A flow meter was installed in the interconnecting steam line between Line II and Line I. Thereby, steam can be metered and sold to Division "A". Steam costs for both contracts have been reduced since the Division "B" steam plant operates at a high efficiency due to increased output.

5. Significant advances in mold design have been made. The use of "Kirksite", a zinc alloy containing aluminum, copper, and manganese, with a "cast in" copper coil, has reduced mold costs and made manufacture of molds at this plant more practicable. No facilities are available, however, for large scale mold manufacture.

6. Advanced Jewel Machine design. A Jewel Machine for Cobra outer component side flats was altered to include a Delta 19-150 drill in place of the tail stock pressure pad. The bottom curvature is then cut on the Jewel Machine along with the side flats. This eliminates one machine and one operator along with one handling operation.

7. Design of new risers for MK 12 inner components. This change of risers reduced the material required "as cast" by 15 pounds and a benefit of approximately $6.00 per casting is being realized.

8. Layaway of all MK 5 and MK 6 tooling was accomplished. The procedures were written using both the Ordnance Ammunition Command Layaway Manuals and the Sandia Base Layaway Procedures. These written procedures were approved by the Ordnance Ammunition Command. Principally, the work consisted of cleaning, decontaminating, application of preservative, packaging in waterproof paper, and boxing each item. The tooling was returned to the Stores Department and warehoused.

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3.102 PROCESS ENGINEERING

2. Changes in the "Special" Cyclotol 60/40 manufactured at Holston Ordnance Plant has caused difficulties in ballistic performance of MK 12 outer components. Using acetone recrystallized RDX in the "Special" Cyclotol 60/40 produced the specified 75 ± 5 micron average particle size. Firing results were "in control" from the start of the program using this material. A different method of manufacture using cyclohexalone recrystallized RDX in the "Special" Cyclotol 60/40 resulted in an average RDX particle size of 90-100 microns. This material, when used in the MK 12 lens, resulted in a lag in the center of 0.35 microseconds. Contour corrections were made to bring the range within specified limits. However, due to the particle size distribution, it is apparently not possible to obtain consistent firing results. The large RDX particles cause a failure in the propagation of the detonation wave through the thin shell of Cyclotol 60/40 on the inside cone of the ring lens. This results in erratic firing results. Tests made by Los Alamos Scientific Laboratory have established as fact the above phenomena.

3. Twenty-five sets of MK 12 components were manufactured on a special off-schedule requisition for the Los Alamos Scientific Laboratory. It was requested that the material be manufactured in one continuous run and that the quality of the material be as high as possible. Special blending of the Cyclotol 60/40 batches within one lot, and Cyclotol 75/25 batches within one lot, was done for the purpose of uniformity. The results of this effort were gratifying with respect to both quality and uniformity. The quality control samples were such that the whole of the 25 sets could be considered as a single batch.

4. The Quality Assurance Program carried on by this Section was considerably behind schedule. The metal parts delivery was slow and schedules could not be maintained. This will increase the Quality Assurance load during the last half of the Fiscal Year by a factor three.

5. A change over from "Stellite" to carbide cutting edges on all cutter heads was effected during this period. This almost immediately reduced grinding and sharpening of cutters by approximately 60%. With improved grinding techniques and further experience, it is conceivable that further reductions in cutter turnover will result.

6. Process changes on the MK 12 inner component were made, with the approval of LASL, for improved production efficiency. They consisted of changing the operating sequence as follows:

From:	To:
1. Saw Riser	1. Saw Riser
2. X-ray	2. X-ray
3. Machine Top Flat	3. Machine Top Curvature
4. Machine Side Flats	4. Machine Side Flats
5. Inspect	5. Machine Bottom Curvature
6. Machine Top Curvature	6. Inspect
7. Machine Bottom Curvature	
8. Inspect	

To accomplish this required a change in the side flats cutting fixture and a change in the Sheffield final inspection gage. The change resulted in the reduction of one machining, one inspection, and two handling operations in addition to increased machining accuracy.

3.103 RESEARCH AND DEVELOPMENT

The Research and Development Engineering Section was established to investigate new and improved methods for manufacturing explosives. Its purpose is to compliment the H.E. Systems basic scientific Research and Development Program by including the countless relatively obscure variables which become apparent only at the production plant level. It also provides the opportunity for investigating suggested improvements in the production process which at their conception appear encouraging, but whose ultimate advantage can be established only through a logical sequence of study and experimentation.

The following is a discussion of the progress made on Research and Development Projects during the first half of Fiscal Year 1955:

H.E. Scrap Recovery

Completed investigation into the feasibility of recovering scrap Cyclotol 60/40 and 75/25 for resale. This investigation included melting the scrap and casting in uniform pellets suitable for re-use.

For the melting operation a jacketed steel preheat tower, 19 inches inside diameter by five feet tall, was

fabricated and mounted on a jacketed TNT melt grid. Steam at 10 psi was used in both the tower and grid. The preheat tower was filled with Cyclotol scrap and melting rate experiments were conducted. When the tower was maintained full of scrap, the melting rate was approximately 7.5 pounds per minute. The melting rate decreased with decreasing height of material in the preheat tower.

For the casting operation an experimental jacketed pouring pot equipped with a paddle type agitator was fabricated for use with an experimental size "Water-Bed" conveyor obtained from Sandvik Steel Inc. The Sandvik Conveyor Unit No. 1-B had a 12 inch wide stainless steel belt with a center to center pulley distance of 7 feet, and a 10 inch wide by 54 inch long water bed. A variable speed drive permitted a range of belt speeds from 0 to 7.7 feet per minute. The jacketed pouring pot was fabricated from an insulated powder can by replacing the insulation with copper tubing to conduct the heating medium (steam or hot water). Seven 1/4 inch outlets were drilled in the bottom and provisions made to vary the outlet size with bushings. The pouring pot was mounted over the conveyor so that its bottom was 3½ inches above the belt directly over the

end of the water bed section. Tests were made using various combinations of melt temperature, pour openings and liquid level head in the pouring pot, conveyor belt speed, coolant water flow, and room temperature to determine the optimum operating conditions for obtaining cooled uniform pellets of H.E. that could be easily boxed. On the basis of the results obtained, a 7/8 inch wide by 3/32 inch thick ribbon, and a belt speed of 7.5 feet per minute, gave the best overall yield. This was accomplished with a room temperature of 85°F, pouring pot at 200°F, 1/8 inch diamter pour openings, and agitation in the pot at 75 revolutions per minute. The rate of flow of cooling water greater than 1.1 gallons per minute had no noticeable affect, but air flow across the belt did affect the cooling rate. Facilities to measure this effect were not available, but it was evident that an air duct over the belt would be beneficial.

On the basis of these studies, a project request for provision of production facilities funds to construct a scrap recovery plant was prepared. This request was approved, funds allocated, and construction work started 15 December 1954. The advantages of this scrap recovery plant are increased value of scrap plus a means by which classified scrap can be utilized. Previously, classified scrap had to be destroyed which entailed a costly special handling and burning procedure.

The scrap recovery plant, capable of recovering 900 pounds of scrap per hour, is expected to be ready for operation in June 1955. It will utilize two preheat towers mounted on a single melt grid, two agitated standardization holding reservoirs for continuous operation, and a Sandvik patented "Water-Bed" cooling conveyor. This conveyor will have a 32 inch wide stainless steel belt on 16 foot centers, a 13 foot long water bed, and a capacity of 2200 pounds per hour.

H.E. Valve

A report was prepared describing the development of a valve to control the flow of molten high explosives. This project was predicated by the commerical unavailability of a compact jacketed valve that would control the flow of molten explosives in a safe, positive, and rapid manner. The H.E. Valve, as it has been named, controls flow by admitting compressed air into, or evacuating a chamber surrounding, a flexible neoprene tube. This respectively collapses or opens the tube, thereby controlling the flow of material through the valve. This chamber is surrounded by a jacket through which steam or hot water is circulated to maintain the temperature of the material and prevent freeze-up. These valves have been used successfully in both manual and automatic operation since they respond equally well to control by means of a lever operated two-way, 3 port valve, or a solenoid valve. For increased versatility the solenoid valve can be activated manually by push buttons, gravimetrically by a load cell mechanism, or electronically using a liquid level device.

Improved Quick Couplings

The purpose of this project was to study several commercially available quick disconnect check valve couplings in order to establish their applicability as mold fittings, and to determine if any of them would be superior to the Hansen couplings in use at this installation. The fittings were rated

on their hydraulic characteristics, cost, maintenance, and wearability. No coupling tested was sufficiently superior to the Hansen coupling to justify replacing the Hansen coupling at this time. The direct benefits derived from this project are obscure since a superior coupling was not found. However, the data collected confirmed the original selection of Hansen fittings for this installation, and the tabulated information is available for future project evaluation where quick disconnect couplings are required.

Contaminated Water Disposal

Prepared and distributed Research and Development Report No. 6-54-3 covering methods for the disposal of TNT contaminated effluent water at this installation. The most successful method was found to treat the contaminated water with fly-ash from our powerhouse. This method, using activated carbon as a decolorizing and de-bitterizing agent, proved most practical because it permitted us to utilize a waste product (fly-ash) to eliminate the objectionable properties (color and taste) from the effluent water. This method is currently being investigated more completely by the Ordnance Ammunition Command.

Utilization of Mixed Scrap

This project was undertaken for the purpose of finding an economically feasible use for mixed(Cyclotol 60/40 - Baratol) explosive scrap. At present this scrap is an expense item, having no market value, which must be collected and destroyed by burning. The mixed explosive was labeled "Silas Mason Explosive" in a report of tests conducted on it by the Ordnance Corps at Picatinny Arsenal. After conducting preliminary tests, Picatinny Arsenal reported that the results indicate Silas Mason explosives might be suitable for use in place of cast TNT in certain munitions. It can be manufactured from scrap material at a cost of less than five cents per pound and tests indicate that, compared to TNT, it possesses equal brisance, less sensitivity to detonation, and a higher detonation rate. An additional 1000 pounds of Silas Mason explosive were prepared and shipped to Picatinny Arsenal in October 1954 for further evaluation tests.

Universal Cutter Grinder

The objective of this project was to design and procure a prototype model of a special cutter grinder that would be capable of grinding cutter blades (concave and convex) without removing them from the cutter heads. A prototype model of such a grinder is now on order with delivery scheduled for July 1955. It will

enable us to grind cutter blades in one-half the time currently required and its cost can be amortized in less than one year.

Heat Transfer and Mixing Characteristics in Agitated Vacuum Kettles

Began an investigation into the empirical relationship of heat transfer and mixing characteristics as they apply to melting and pouring explosives at this installation. Only a limited amount of time has been spent on this project to date because of other more pressing requirements.

Oven Cooling of Molds

Initiated to investigate the practicability of controlled cooling of molds in an oven and the preliminary results have been encouraging. Sufficient evidence was collected to indicate that satisfactory castings can be obtained using a forced air convection oven and a constant temperature water bath. Work has been started to investigate the use of a radiant oven in place of the convection oven. A radiant oven would have the advantages of a smaller, more compact, equipment installation and, by nature of its operation, would lend itself more readily to a continuous, automated, mold cooling process.

Furane Resin and Other Adhesives

Conducted experiments to determine the effects of local humidity conditions upon the adhesive bond strength of catalyzed Furane Resin X-2. Began investigation into advantages of using

fillers to minimize run-out. Conducted experiments to determine the practicability of using both Reagent CM and Catalyst Z-1A with Furane Resin X-2. Experimental results using this double catalyst procedure have been very encouraging and have consistently yielded adhesive bond strengths in excess of 40 inch-pounds after four hours (normally requires twenty-four hours). The use of this method would require less than half the number of mandrels needed by the current method, would reduce the in-process time, and provide increased flexibility for accelerated production with no increase in facilities.

Anti-cracking Additives

The purpose of this project is to investigate experimentally the merits of anti-cracking additives. Experiments have been started to study the effectiveness of alpha-nitronapthalene as an additive, and to establish quantity and temperature levels for its use. The study of alpha-nitronapthalene is based upon the promising results obtained in tests of anti-cracking additives begun at the Salt Wells Pilot Plant.

Special Multiple Operation Production Machine

Began investigation of the principles of automation as it would apply to the explosive machining process; especially a study of the feasibility of a multiple head, automatically sequenced operation, production machine, complete with gaging stations,

which would take as-cast components and discharge completely machined and gaged pieces.

Effects of Process Variables on Product Quality

This project was established to conduct a systematic study to determine the effects of physical and chemical variables on product quality and establish limits for their control. Initial work has been concerned with a study of physical assembly factors which affect detonation characteristics, and also the relative merits of using aluminum silicofluoride on test fire castings.

Improved Mold Design

Investigation of methods to reduce waste in mold risers lead to ideas for greatly modified, entirely new, molds. The use of cast "Kirksite" inserts, as well as cast-in-coil molds made of "Kirksite" is being investigated. An experimental light weight sheet metal mold for use in conjunction with oven cooling experiments also was developed. Several experimental molds have been completed, and acceptable castings obtained with significant savings in material.

3.200 CHEMICAL LABORATORY

The Chemical Laboratory is responsible for the routine quality control sampling of products, as well as raw material acceptance analysis and various non-routine qualitative and quantitative analysis. Other laboratory functions include Research and Development Projects and work conjunctive with the Engineering Department.

A spectrophotometer was purchased to enable more rapid and sensitive testing. One example of this is soil samples. Twelve samples require 4½ hours by spectrophotometric means and 9 hours by conventional methods.

Methods for recovery of two solvents used extensively in the laboratory have been perfected. The benefits derived from this amounts to $160.00 per week for the acetone recovered, and $85.00 per week for the benzene recovered.

Development of gluing methods and techniques using catalyzed Furane Resin have been carried on with the Engineering Department. Experimentally, the setting time of Furane Resin has been reduced by 83%. Details of these experiments and results obtained are available in H.E. Systems Research and Development Monthly Reports published at this installation.

The laboratory has installed equipment for particle size analysis of RDX in Cyclotol. This is extremely critical in present ballistic performance and, therefore, the accuracy of this analysis is of upmost importance.

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3.300 MAINTENANCE

Reduced schedules, along with economy measures, permitted the consolidation of operation into one-half of the production line. Layaway into a standby status was immediately started on the following buildings:

Bldg. 1-137-2	Cafeteria
Bldg. 1-05-1	Melt
Bldg. 1-10	Machining
Bldg. 1-12	Machining
Bldg. 1-70	Filter House
Bldg. 1-74	Rest House
Bldg. 1-75	Rest House
Bldg. 1-76	Rest House
Bldg. FS-1	Firing Site Administration
Bldg. FS-2	Firing Site Shop
Bldg. FS-5	Firing Site Magazine
CB Yard	Storage Area

The buildings and equipment were placed in first-class operating condition prior to the application of preservatives. All process equipment has been dismantled, decontaminated, and replacement of parts made where necessary. All mechanical parts were coated with the appropriate preservatives in accordance with the approved procedures. During layaway, the following consolidations were made: The photographic laboratory in FS-1 was moved to the X-ray building; the test fire preparation was moved from FS-5 to Building 1-71 (formerly a rest house), and the electronics shop was moved from FS-2 to Building 1-129. These consolidations permitted the closing down of the firing site steam plant.

Six major machines were purchased for the Machine Shop:

1. Do-All, Model 36-3, Contour-Matic Band Sawing, Filing, Polishing, and Grinding Machine. This machine was purchased for $4,153.00 to replace a wood type band saw converted for use on metal.

2. Toolmakers Lathe - 14" x 54" center, Monarch Series "61", 16-speed helical geared head. This lathe was purchased for $10,729.00 as an addition to shop equipment. Its purpose is to expedite certain jobs through the shop more accurately and rapidly.

3. Hammond, Model V8, WP-Wet-N-Dri Abrasive Belt Sander. This sander was purchased for $1,696.60 as an addition to shop equipment.

4. Walker-Turner, Model 1142-21, Bench Model Drill Press with 20" Power Feed, Hand Raising Mechanism, 3/4" Capacity. The drill was purchased for $485.00 to replace an obsolete model which was worn out.

5. Cincinnati-Gilbert Multi-Duti Ball Bearing Radial Drill, Model 3A, with Universal Table, 4 ft. Arm, 9" Column. This drill was purchased for $8,230.00 to replace a 15-year old model. The life expectancy for a machine of this type is approximately eight years.

6. Cincinnati 12" x 36" Hydraulic Universal Grinding Machine, Model ER, with high speed internal grinding attachment spindle. This grinder was purchased for $13,370.00 to replace a Norton Grinder. The Norton Grinder was 14-years old and was worn to the point that tolerances required could not be held.

The Maintenance Department incorporated the operation of the Division "B" steam plant into its operations. During the period of change over from the Utilities Section of Division "A" to Division "B" Maintenance, the entire steam plant was renovated. This consisted of replacement of worn parts and tubes, cleaning and painting, and recalibration of instrumentation.

3.400 REPRODUCTION

The responsibilities and functions of the Reproduction Department are as follows:

1. Printing and duplication of plans, drawings, pictures, x-rays, and printed materials by relief, planographic, stencil, and photographic mediums, such as letter press, offset press, spirit duplicator, stencil duplicator, blueprint, electo-static, photo copy, and photographic equipment.

2. Minimum of contributory services such as composing, typing, folding, collating, stitching, cutting, and padding.

3. Reproduction services as required by Division "A". The cost of these services are reimbursed by Division "A".

4. Maintenance of necessary records and reports to support the above functions.

The following equipment is used in carrying out these responsibilities of printing and duplicating by:

1. Relief, such as Multigraph, Addressograph, embossograph, and graphotypes.

2. Planograph, such as long and short run multilith offset presses, Ditto duplicators.

3. Stencil, such as mimeograph and silk screen.

4. Photograph, such as direct white print machine, xerox unit, direct and reflex photo copiers, offset camera, continuous microfilm camera, press camera, 35mm camera, xerox camera, contact printer, enlarger, continuous microfilm processor, wash tanks, water

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5.000 INSPECTION

5.100 PROCESS INSPECTION

The MK 12 program was in process through the MC-181 assembly stage with the 1-40 Building processing H.E. for both the MK 12 and Cobra programs. A total of 14 inspectors were employed in Buildings 1-40 and 1-61 for these operations. The machining schedule increased in September to allow a bank of H.E. to be built up for the MK 12 and to produce a special order for LASL.

In November the tool made sample was completed and approved for the Cobra program. Also, two tool made samples were completed and approved on the final mechanical assembly of the MK 12. Final acceptance of the MK 12 could not be completed due to a shortage of MC-412's. One inspector was re-hired for the 1-61 Building as metal parts were being made available.

During December, operations were not normal due to a shortage of 1E24 detonators and MC-412 assemblies. Building 1-13 was made available for some final packaging on the MK 12, but no regular schedule of operations was planned at this time. The first few MK 12 assemblies were completed, and the car dunnaging plan was approved during the last of the month.

Product acceptance during this period was good, and acceptance of MK 12 H.E. was slightly better than on the Cobra program.

5.200 TEST FIRE

During the subject period, the Test Firing personnel and all operations except actual firing were moved from the F. S. Area to Line 1. A shop was set up in one bay of Building 1-71 for the preparation of pin-switches and leads, and for processing firing requests when blocks are received via the ramps from Building 1-40. The other bay of Building 1-71 is used for the preparation of the block itself which is mounted on an expendable wooden support.

Detonators are stored in a locked vault in Building 1-73.

During November, the count of Test Firing personnel was reduced to three when the test foreman, who had worked at this activity since 1949, terminated by his own choice. The senior test operator, who had been with this activity for a comparable length of time, took the foreman's position. During the subject period, Alfred Conor submitted a suggestion for connecting the signal wires for tests so that a considerable saving in man-hours and materials was accomplished. The suggestion was approved and Mr. Conor received an award of $36.00.

Only a few inconveniences were experienced due to the move from the F.S. Area, such as inter-area shipment of blocks, development of film between shots, and less time for general equipment checks.

The quality of the product, as reflected by test firing results, was shown to be good for the MK 12, as that item remained within statistical control during the entire period. With the advent of manufacture of shaped Cobra blocks, firing results were fair but not within control limits.

5.300 RADIOLOGY

The personnel count of the Radiology Section for the period was six. New techniques were developed for radiography of cast-shaped Cobra OC's and were approved by LASL for use.

Radiographic quality of both products was generally good during the period. MK 12 SC's and OC's, and Cobra OC's were on sampling plans most of the time, and losses of other items were, for the most part, due to bubbles.

Very little maintenance of machines and equipment was necessary in the Radiographic Section.

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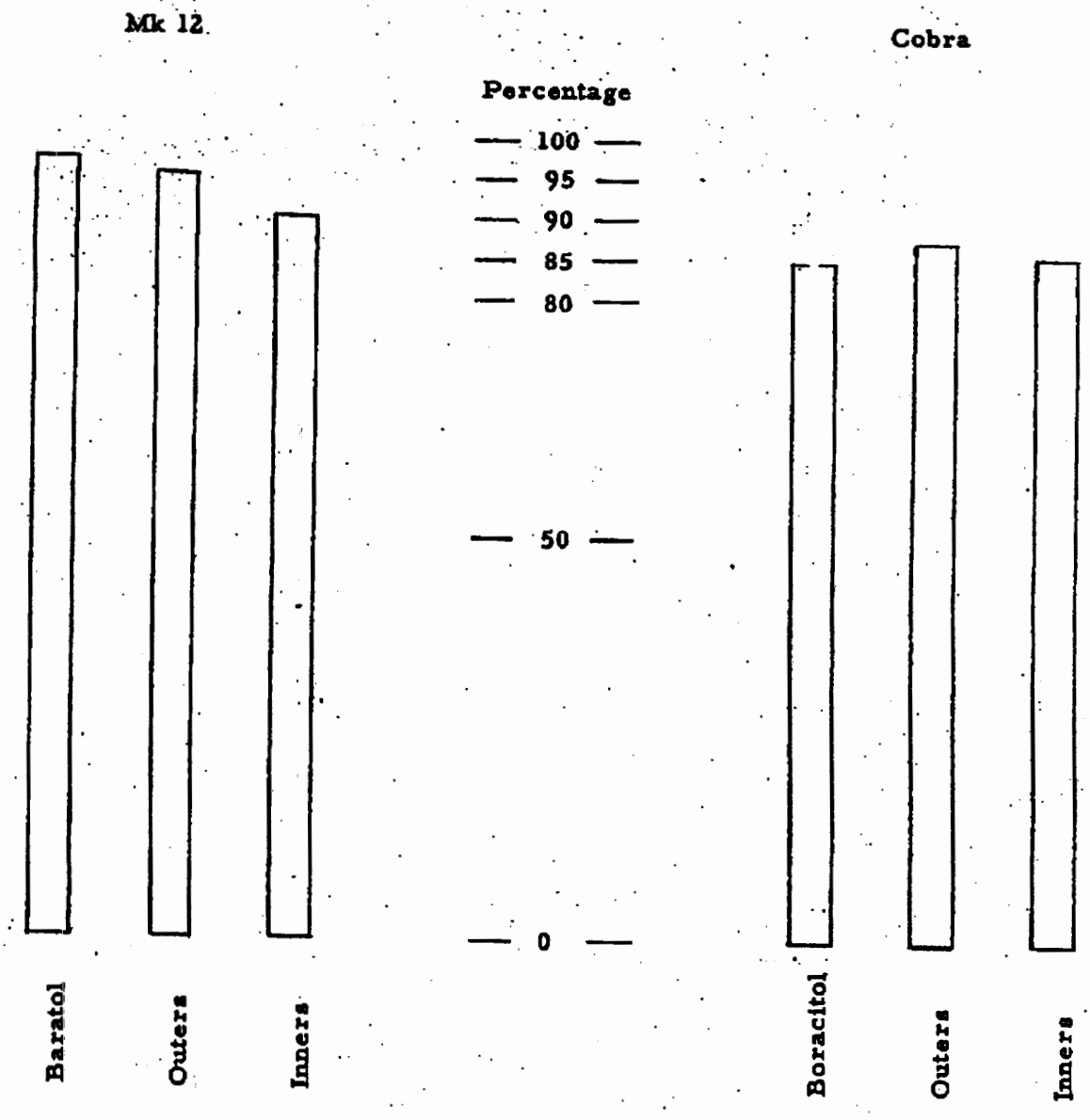
PRODUCT ACCEPTANCE*
JULY 54 THRU DEC. 54



*Acceptance based on Test Fire, X-ray, Laboratory results and Process Inspection thru the 1-40 Building.

6.000 PRODUCTION

Monthly HE schedules for Plants "A" and "C" were consistently met during the period 1 July - 31 December 1954. However, due to a critical shortage of components supplied by outside vendors, assembly of items dropped behind schedule necessitating the storage of large quantities of HE in process for the assembly plant.

Production, therefore, was considerably below capacity for this report period. As the result, a layaway program of approximately 50 percent of operating buildings and equipment for inactive programs became necessary.

As component parts become available, little difficulty should be experienced in resuming a full schedule in the assembly section.

Quality of the product for this reportable period was high. (See Yield Charts on Page 57.) Costs, also, were exceptionally good considering the many interruptions from the manufacturing plant to the assembly plant, plus the necessity of additional handling and storage incurred because of the shortage of vendor supplied items referred to in the first paragraph.

Production personnel for the period was fairly constant with an average of 132 workers for each month. This compared with 171 for each month of the previous period. This is a decrease of 21.7 percent in operating personnel.

6.100 TOOLING LAYAWAY PROGRAM

During this reportable period, Production personnel assigned to layaway activities decontaminated the floors, walls, and equipment in Buildings 1-137-2, 1-05-1, 1-10, and 1-12. Also, all remaining tooling was processed for storage outside the line. A sizeable amount of seldom used equipment, furniture, and miscellaneous items were consolidated, catalogued, and stored in Building 1-10 following decontamination.

In this group were included MK VII molds and related items, several types of pouring troughs and funnels from the melt building, handling carts, machining carts, paint carts, bay desks, some assembly equipment, and other pieces necessary for production on short notice.

This layaway program was started prior to this reportable period following receipt of General Procedures GLP-1-56 and GPW-1-56 from the Engineering Section. These procedures set up Building 1-12 as the processing area. Building 1-05-1 was used for decontaminating items prior to processing. Building 1-53 was used as a loading site for crated items to be placed in warehouses.

The procedures specified the responsibilities of all groups in coordinating the movement of items from one step to another. Larger items were removed from the line first, thus permitting more room in the general work areas. Consequently, MK V and MK VI molds were removed from the third floors of Buildings 1-05-1 and

1-05-2 and were processed under the provisions of Procedure SMP-1-56, SPECIFIC PROCEDURE FOR PRESERVING AND PACKING OF ALL MOLDS. Molds were dismantled, where necessary, in Building 1-05-1 and were decontaminated and tested by Production personnel, and tagged "Visibly Decontaminated" by the Safety Department prior to removal to Building 1-12.

Following processing and crating, each item was again checked by the Safety Department, and the completed crate was stenciled to show the degree of contamination. For each piece a storage record card was made in triplicate. One card was placed inside the crate, a second stapled to the outside of the crate, and the third copy forwarded to Stores for their records. Completed items were transferred by rail to Yard "E" for storage. Approximately 493 completed molds were processed during this time.

The balance of the tooling fell into seven major groups, as listed below with the procedure followed in processing pieces with each group:

Procedure SCHP-1-567	PRESERVING AND PACKING PROCEDURE FOR CUTTER HEADS
Procedure SEMP-1-5	PRESERVING AND PACKING PROCEDURE FOR EXCESS MK V SC, CC, AND IC MOLD PARTS
Procedure SAFP-1-5	PRESERVING AND PACKING PROCEDURE FOR MK V FINAL ASSEMBLY FIXTURES
Procedure SIP-1-5	PRESERVING AND PACKING PROCEDURE FOR MK V SC AND CC SPARE INSERT PIECES

Procedure SCAP-1-5	PRESERVING AND PACKING PROCEDURE FOR MK V CC AND IC CLUSTER ASSEMBLY FIXTURES
Procedure SFP-1-57	PRESERVING AND PACKING PROCEDURE FOR FOUNDRY EQUIPMENT FOR MK V TOOLING
Procedure STP-1-57	PRESERVING AND PACKING PROCEDURE FOR MK V TOOLING JIGS, FIXTURES, AND TEMPLATES FROM ROCK ISLAND ARSENAL

Hundreds of individual items were processed and crated under the provisions of the above procedures. In some instances, special problems were encountered and minor modifications made in the procedures to enable personnel to do a more thorough job of preserving.

The layaway program was completed on November 19, 1954.

6.200 PLANTS "A" AND "C"

Preparation Area. The Preparation Area worked on a reduced schedule during this period, operating on a single shift and alternating between Barium Nitrate-Boric Acid processing and TNT-Composition "B" processing. A total of one production foreman and seven production operators were assigned to this area during this period. Roughly, one-half day each was scheduled for processing materials in Building 1-60 and Building 1-08-1.

Only minor problems involving the roller analyzer for Barium Nitrate grinds in Building 1-60, and some difficulty with lumpiness in both Barium Nitrate and Boric Acid raw materials were encountered. These were corrected and caused no loss of time or quality.

Melt Building (1-05-2). During this period the major accomplishments were:

1. The casting of shaped Cobra SC and OC blocks. The inserts for these components were put into use in mid-July. Special racks for holding the inserts for storage and washing were fabricated. No special problems were encountered in their use.
2. The fabrication and use of a new short riser top plate for MK 12 inner components was begun during November. This riser not only eliminated the troublesome probe which was a part of the original equipment, but, also, saved considerable material per piece. Revised cooling cycles for this component were worked out prior to the time they were put into use.
3. The approval and use of compressed air for drying washed molds resulted in a significant savings of time on heavy casting schedules. The procedure for this activity was developed jointly by Production and Safety personnel. It eliminated the time-consuming hand-drying of each mold with dry rags, and reduced the total drying time by about 40 percent.

The melt and cast operations were performed on a three-shift basis during this time. One divisional supervisor, one production foreman, and seven explosive operators were assigned to each shift.

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Machining Building (1-40). During this six-month period Building 1-40 was staffed with one divisional supervisor, four production foremen, and twenty production operators. In addition, a set-up foreman, two set-up machinists, and two guage men were carried on the 1-40 roster.

Among the major accomplishments in the machining section were:

1. In September a special procedure for fabricating beta hex blocks for MK 12 plugs from round OC's was adopted. This procedure enabled each piece to be used to make two plug betas instead of the usual one. A slight modification of the machining and gauging of the piece was made. Later the block was sawed into two pieces and each used for gluing to the pent. This procedure was estimated to result in the benefit of several thousand dollars each year.
2. A special shipment of twenty-five units of MK 12 H.E. to LASL was made in October. The casting of the blocks for this program began in September. Machining was accomplished during October. The final inspection and boxing was completed and the units shipped as a single group late in October. A smaller shipment of sixteen wax blocks fabricated for LASL was also processed through Building 1-40 and shipped at the same time.

3. The use of a new industrial solvent, VYTHENE, was begun in October in Building 1-40. This solvent replaced trichloroethylene and acetone for cleaning purposes, especially at the gauge maintenance shop. The low toxicity of this new solvent makes it ideal for use at this location.

4. Considerable study of cutter heads and head yields on the various components was made during this time by Engineering and Production personnel. As a result, many of the curvature heads having cutter blades of "Stellite" were later replaced with tungsten-carbide blades. The latter type had a much longer life and the change over resulted in measurable time savings on the part of set-up personnel and head-sharpening personnel.

Buildings 1-05-1, 1-10, and 1-12. These buildings were thoroughly decontaminated and all equipment either removed or placed in stand by status during this time. The 1-10 building was placed in use as a temporary storage site for decontaminated items which might be needed on short notice for operations within the line.

Building 1-53. Appropriations for converting this building into a scrap recovery plant were approved, and construction to modify the building was begun on December 13, 1954.

REPORT OF MONTHLY YIELD - BASED ON CALENDAR MONTH

COMPONENT CODE		JULY %	AUGUST %	SEPTEMBER %	OCTOBER %	NOVEMBER %	DECEMBER %
MK 7:							
710	SC						
720	OC	63.32					
725	OC CLUSTER	95.00					
730	IC	97.16					
740 & 7240	WAFER	93.00	97.00	91.00	87.00	85.00	88.00
757	TD	100.00					
759	ITD	100.00					
COBRA:							
7210	SC	89.84	93.23	63.10	91.05	91.87	94.05
7220	OC	91.89	94.94	95.20	72.69	88.96	83.38
7225	OC CLUSTER	100.00	100.00	100.00	100.00	100.00	100.00
7230	IC	50.89	93.82	86.60	62.86	92.00	91.39
7257	TD	100.00	100.00	100.00	100.00	100.00	100.00
7259	ITD	89.00	100.00	100.00		100.00	
MK 12:							
1210	SC	95.57	97.11	98.00	98.10	97.04	97.18
1220	OC	94.96	95.98	94.80	96.39	93.65	95.22
1225	OC CLUSTER	100.00	100.00	100.00	100.00	100.00	100.00
1230	IC	96.12	90.56	86.70	91.64	92.12	91.35
1257	TD	85.00	95.00	96.00	82.00	94.00	93.00
1259	ITD	87.00	95.00	94.00	95.00	79.00	100.00

SECRET

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PRODUCTION SUMMARY - PLANTS "A" & "C"

MELT LOAD - PLANTS "A" & "C"

COMP. CODE / PERIOD	1210	1220	1230	7210	7220	7230	7240	68-336-270	68-394-270	68-425	68-415	68-428-270
JULY 1954	3561	3946	416	1119	858	180	576					49
AUGUST 1954	4078	3318	511	2294	1824	696	2396		100	32		43
SEPTEMBER 1954	4735	4460	796	480	480	175	576			24		12
OCTOBER 1954	3584*	4042*	704*	567	375		476		100		18	7
NOVEMBER 1954	2807	3831	541	363	477	865	768		50		25	79
DECEMBER 1954	4986	4599	608	758	572	1140	4008				10	

*Includes requirements for LASL Requisition #IC-91-1

7210 and 7220 productions were cast to shape effective with the following batches: 72 407 303 - - - - 1-
72 407 308 - - - - 2-

SECRET

SECRET

6.300 MISCELLANEOUS

July 19, 1954 - Line I First Aid Station was closed.

October 11, 1954 - Bldg. 1-71 vacated by Production and turned over to Inspection for FS Operations.

October 13, 1954 - Bldg. 1-53 vacated by Production and turned over to Engineering for construction.

October 27, 1954 - Bldg. 1-73 vacated by Production and turned over to Stores for 1E-24 detonator storage.

7.000 SAFETY AND SECURITY DIVISION

7.100 SAFETY DEPARTMENT

Weekly foreman-conducted safety meetings from materials prepared and distributed by this Department aided materially in the prevention of any serious injuries within Division "B" during the entire period covered by this report. Both the frequency and severity rates were .00.

Each injury, regardless of severity, was carefully investigated, and corrective measures for the prevention of recurrence were taken.

The statistical record for Division "B" for the period 1 July - 31 December 1954 was:

Injuries	73
Lost Time Cases	0
Total Cases	73
Days Lost	0
Man Hours Worked	397,122
Frequency	.00
Severity	.00

As an aid to the effectiveness of the overall safety program within Division "B", a Supervisor Safety Committee was organized during this reporting period. The primary function of this Committee is to coordinate injury prevention through the combined efforts of the responsible supervisor.

Complying with Par. 112, OED M-7-224 C3, this Committee meets once each month. Membership to the Committee is rotated every six months. A representative of the Safety Department serves as advisor and secretary at each meeting. Minutes of each session are typed and distributed to each Committee member and the Division Manager.

Subject material discussed includes such topics as accident trends, safety audits, general and specific safety hazards, the foreman's group safety meeting program, and current safety events as they may apply to workers within Division "B".

A Traffic Safety Board, of which a representative of the Safety Department is Chairman, held meetings weekly to discuss Plant traffic problems and the prevention or elimination of motor vehicle accidents.

Also, a Joint Safety Board, composed of Ordnance and Contractor personnel, held meetings the second Tuesday of each month to discuss and act upon all matters pertaining to safe operations and injury prevention.

The entire program has been enthusiastically received and splendid cooperation is being given by the employees, as evidenced by the Division's injury frequency and severity rates.

Workman's Compensation claims and payments for Division "B" employees are processed by the Safety Department.

7.200 SECURITY FORCE

Due to continued curtailment of operations at the Iowa Ordnance Plant, and the policy of combined seniority of guards for Divisions "A" and "B", a number of terminations and transfers of members of the security force had to be made during this report period. This, however, did not affect the efficiency of the force.

A complete new set of orders was prepared, published, and placed in all guard order books during this period. The new orders took into consideration the change in duties of certain posts and tours made necessary by the closing of certain restricted area gates, and the elimination of other functions due to decreased production operations and personnel.

Training of security personnel was maintained at a high level throughout the six-month period. Every member of the force had at least two hours of instruction and practice on the pistol range. Other training classes were conducted in presenting pistols for inspection, pass and badge procedure, operation of badge exchange, organization and security, post regulations, public relations, and functions of a security force.

Six members of the force passed the Red Cross Basic First Aid Training Course, and two members qualified to have their First Aid Instructor's Certificate renewed during this period.

An automatic alarm device was installed at Post 1 in the Administration Building controlling the safe in the Office of the Manager, Burlington Branch Office, U.S.A.E.C., as an additional security measure.

7.300 FIRE FORCE

Every employee in Division "B" participated in the observance of Fire Prevention Week in October, as presented by members of the Plant's fire-fighting force. Talks were made by members of the force on methods and ways of preventing fires and, also, on the proper procedure for turning in a fire alarm. A film depicting the various types of fire extinguishers used at the Plant, and how to operate them, was shown. Members of the fire-fighting force also put on a demonstration using Department equipment. Posters and other display materials were prominently displayed within the Division during the entire week.

In keeping with reduced operations Plant-wide, Fire Station No. 2 was closed and secured on 16 August 1954, and the equipment moved to the main garage building. Three crew chiefs and three driver-operators were terminated as the direct result of this action.

4.19 RADIOACTIVE WASTE AND RADIOACTIVE METAL WASTE

4.19.1 RADIOACTIVE WASTE

4.19.1.1 The term radioactive waste is defined as gloves, Kimwipes, swipes, rags, paper, vacuum cleaner collections and filters, used in cleaning or handling uranium metal or uranium oxide residues.

4.19.1.2 Such radioactive wastes shall be collected in metal containers lined with a plastic bag. The metal container will be color coded and labelled (see photo #11).

4.19.1.3 The filled plastic bags will be removed from the metal container and securely sealed with a special "Radioactive Material" label tape prior to collection by Production Control in Bldg. 1-11 (see exhibit #2).

4.19.2 RADIOACTIVE METAL WASTE

4.19.2.1 The term radioactive metal waste refers to accountable quantities of uranium metal waste or uranium base metal alloy waste generated by approved operations. This waste metal shall be delivered to Bldg. 1-11 for disposal per S.O.P. No. S-132.

4.19.2.2 Small quantities of uranium waste or uranium alloy metal waste, produced as metal shavings contaminated with explosives from a machining operation, shall be handled as follows: Collect cloth filters, uranium and explosive cuttings in a plastic bag containing water. Securely sea the bag with "Radioactive Material" label tape (see exhibit #2) and place in a fiber explosive scrap container (see photo #2). The delivery of this material to the Explosive Disposal Area should be expedited.

4.20 DISPOSAL OF RADIOACTIVE WASTE

All radioactive waste generated at the Burlington AEC Plant, shall be packaged per S.O.P. No. S-132 and shipped to Pantex to the burial ground with the exceptions indicated in step 4.19.2.2 above.

4.20.1 DISPOSAL OF BERYLLIUM WASTES

4.20.1.1 Waste pieces of beryllium metal, vacuum cleaner collections and filters, and other wastes generated during beryllium metal repair operations (such as sanding) shall be packaged and delivered to Bldg. 1-11 for disposal per S.O.P. No. S-132.

4.20.1.2 Kimwipes, gloves, etc., used in the daily routine cleaning and handling of beryllium metal components shall be collected in metal containers lined with plastic bags (see Photo #7). The filled plastic bags shall be securely taped closed and disposed of as contaminated trash.

4.21 CLASSIFIED SCRAP PAPER

(Reference Administrative Practice and Procedures No. 1013, Control of AEC Classified Documents.)

4.21.1 Shredders - All classified wastepaper capable of being shredded should be processed through shredders when possible. The operation of shredders will be the responsibility of the department destroying the documents.

Shredded classified scrap paper may be packaged and sealed in cardboard boxes, canvas bags or plastic containers in accordance with the above referenced document.