SECTION II

PURPOSE AND SCOPE

In accordance with the provisions of Executive Order 11508, a physical survey of IAAP, Burlington, Iowa, was conducted during the period 19-20 September 1972. The survey team, from the Office of the Assistant Secretary of the Army (Installations and Logistics), consisted of Mrs. Odette M. Cranno (Team Chief) and Mr. Robert Olson. The General Services Administration (GSA) was represented by Mr. Charles W. McKinney.

A briefing concerning the current mission, future planned missions, and proposed plans for base development was presented to the survey team during the morning of 19 September 1972 by the Commanding Officer, LTC C. Frederick Kleis. Mr. R. M. McCutcheon, Area Manager of the Burlington AEC Plant; Mr. D. E. Heffelbower, Plant Manager for Mason and Hanger-Silas Mason Co., Inc.; and other members of the staff were consulted during the survey.

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SECTION III

AREA DATA

LOCATION

The IAAP is located 8 miles west of Burlington, Iowa, on U.S. Highway 34 at Middletown, Iowa, on the main line of the Burlington Northern Railroad.

COMMUNITY DATA[1]

Burlington is a modern city of 31,639 population located on the west bluff of the Mississippi River. It was founded in 1833 and was given its present name in 1934 in memory of Burlington, Vermont. Burlington is served by the Burlington Northern and the Rock Island Railroads, Federal Highways 34 and 61, two State Highways, an air terminal, and the Mississippi River. Its educational facilities consist of 18 public schools, four parochial schools, and a junior college. West Burlington is a city of 3,134 people which makes up part of the Metropolitan Area of Burlington. Middletown is an incorporated town of less than 425 population located on Highway 34 adjacent to the IAAP Administration Area. Danville is an incorporated town of about 950 people, 4 miles northwest of the plant area. Mt. Pleasant is located 18 miles northwest of the plant site on Highways 23 and 218 and the Burlington Northern Railroad. This town of 7,000 population is host to a denominational college and a state hospital for mentally handicapped people.

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Ft. Madison is a city of 13,980 population located 12 miles south of the plant area. This city, with its 12 schools, is served by the Burlington Northern and Santa Fe Railroads and Federal Highway 61.

WEATHER AND CLIMATE

The average annual rainfall is 35.22 inches; the mean annual temperature is 51.5°F.; and the average relative humidity is 71.50 percent.

TRANSPORTATION

Rail - Government trackage connects with the Burlington Northern Railroad at the installation boundary. Trackage is available for troop trains and storage space is available for 100 freight cars. No side or end ramps are available. The passenger station and railway express office are 8 miles distant.

Water - Municipal dock at Burlington, Iowa, 10 miles distant, has 150 feet of area for loading and unloading by motor only. Depth of water is 20 feet. Lift is limited to one ton.

Air - The Municipal Airport at Burlington, Iowa, is 10 miles distant.

Bus - The depot at Burlington, Iowa, is 8 miles distant.

PARKS AND RECREATIONAL AREAS

Geode State Park is located 11 miles west of Burlington, Iowa. It is one of the finest recreation areas in Southwest Iowa. It has hundreds

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of acres of natural woodlands which surround a beautiful 250-acre artificial lake. Crapo Park and adjoining Dankwordt cover about 100 acres of land located two miles south on Main Street in the Burlington business district. The park possesses the natural beauty of sheer bluffs, deep ravines, and majestic river views. Des Moines County has 10 additional recreational areas such as picnic areas, museums, and access areas on rivers.

INSTALLATION DATA

a. Physical Description

Land: 19,257 acres (1,388 acres licensed to AEC)

Total Buildings: 938

b. Space Distribution - Army

Construction Category	Bldg. Area (SF)
100 Operational and Training Facilities	29,739
200 Maintenance and Production Facilities	1,050,017
300 Research, Development, and Test Facilities	7,891
400 Supply Facilities	1,697,166
500 Hospital and Medical Facilities	5,625
600 Administrative Facilities	107,241
700 Housing and Community Facilities	189,100
800 Utilities and Ground Improvements	54,503
	3,141,282 SF

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c. Space Distribution - Burlington AEC Plant

Construction Category	Bldg. Area (SF)
100 Operational and Training Facilities	32,892
200 Maintenance and Production Facilities	727,936
300 Research, Development, and Test Facilities	31,471
400 Supply Facilities	178,829
500 Hospital and Medical Facilities	0
600 Administrative Facilities	1,000
700 Housing and Community Facilities	0
800 Utilities and Ground Improvement	23,490
	995,618 SF

IMPROVEMENTS

a. Acquisition Costs: Original cost of land and improvements was $3,504,000, buildings $58,279,000 and production equipment $6,758,000. A four-phase expansion of Atomic Energy Commission facilities which began in 1956 was completed in 1959. As a result of the Korean War and the Vietnam conflict, additional facilities were constructed, and many of the structures and facilities were replaced or updated.

b. Major Construction Planned: There are projects for water pollution abatement, fuel conversion, industrial waste treatment, air pollution monitoring stations, and water quality surveillance stations in current MCA programs.

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BASE POPULATION

Army

Military	Authorized	2
	On-Hand	2
Civilians	Authorized	100
	On-Hand	97

AEC

Civilians[1]	Authorized	42
	On-Hand	41
	RIF To	38

Contractor

Supporting Army Contract	2,155
Supporting AEC Contract	1,127
TOTAL	3,282

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SECTION IV

HISTORY

The land for the IAAP, originally called the Iowa Ordnance Plant, was acquired in November 1940. Originally, the installation contained 20,078 acres. Actual construction began in January 1941. Construction was completed approximately one year later.

The Iowa Ordnance Plant was originally designed, constructed, and equipped for loading, assembling, and packing medium and major caliber shells - 75mm through 8", including their components such as primers, detonators, fuzes, and boosters; mortar rounds - 81mm and larger, including their explosive components; anti-tank mines; anti-personnel mines; and 100 through 2,000 lb. bombs including related fuzes and boosters. An ammonium nitrate graining facility was also provided.

Actual loading operations began on Line I in September 1941, nine months after the start of construction. Line II production was under way in November 1941 and Line III, one month later. Line III-A production was not instituted until January 1943. Initial component production commenced in January 1942, when the first fuzes were assembled on Lines IV-A and B. Ammunition renovation and demilitarization facilities were added in January 1944.

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From the beginning of operations, the plant loaded 75mm to 155mm caliber shells and loaded from 100 lb. to 1,000 lb. bombs.

Production of all items in all lines stopped as of midnight 14 August 1945 upon official announcement of the surrender of Japan. Production after 14 August consisted of completing work in process and renovating rejected ammunition.

As of midnight, 6 January 1946, the plant was changed over from contractor-operated to Government operation and was manned by 227 employees. Government operations during the period of 1946, 1947, 1948, and early 1949 were primarily restricted to long-term storage, surveillance activities, renovation, demilitarization, and reconditioning activities. During this time period, the Ordnance Corps negotiated several contracts for certain work at the plant for the corps under the technical guidance of the AEC.

During the Korean emergency, production of new ammunition was resumed. Certain rehabilitation work was also accomplished. In 1959, the AEC completed construction of operating buildings, warehouses, rail spurs, and the rehabilitation and modification of existing storage and rail facilities.

During Fiscal Year 1965, construction of three new Line I buildings was completed at a cost of approximately $307,000. These buildings include a Holding Building, a Standards Laboratory, and an Engineering and Development Building.

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Practically all buildings, facilities, utility systems, etc., laid away after the Korean conflict were removed from standby status and reactivated to accomplish increased production schedules resulting from the Vietnam conflict.

Rehabilitation and improvement projects essential for direct support of Southeast Asia include the replacement of plant equipment acquired and/or facilities constructed during 1941 and 1942.

In the past 10 years, a total of 69.18 acres of fee-owned land has been declared excess.

On 24 December 1969, GSA conveyed 58.18 acres of land to Levi L. and Olsace L. Heinold by quit claim deed.

On 4 June 1969, 11 acres of land were transferred to US Continental Army Command for the construction of the US Army Reserve Center, Burlington.

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THE IOWA ORDNANCE PLANT

The Iowa Ordnance Plant is situated in the southeasterly part of Iowa, 5 miles west of the City of Burlington, and was designed, constructed and equipped for loading, assembling and shipping each month:

750,000 - rounds of 75 mm high explosive shells
175,000 - rounds of 155 mm high explosive shells
120,000 - 100 pound bombs

or their high explosive equivalent in similar types and calibres; together with corresponding detonators, boosters, fuzes, artillery primers and percussion elements.

From the beginning of operations through September 1943, the Plant loaded from 75 to 155 mm calibre shells and from 100 to 1,000 pound bombs at rates appreciably in excess of the designed capacities.

The location of the Plant is shown on the map facing the page following and the general layout of the Plant, Drawing No. 6987-617, is reproduced in Appendix Volume 3, page 1.

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The Plant includes land, loading and assembly groups, railroad and highway systems, utility services and maintenance facilities and is briefly described as follows:

Tract of approximately 20,450 acres of former farm lands situated in southeastern Iowa about 5 miles west of Burlington served by the Chicago, Burlington & Quincy Railroad

Four shell and bomb loading groups designed to load in excess of 10 million pounds of high explosive per month, together with a plant for converting neutral liquor to Ammonium Nitrate crystals and a plant for reclaiming high explosives from shells and bombs

Seven loading and assembly lines for detonators, boosters, fuzes, artillery primers and percussion elements, together with a plant for fabricating metal parts

Storage warehouses and magazines for inert materials, high explosives, finished ammunition and general plant supplies totaling 362 in number and 1,720,000 square feet, 40 acres, in gross floor area

Transportation Facilities including 100 miles of standard gauge railroad operated with Diesel-electric locomotives and 100 miles of highways with a fleet of 275 automobile cars and trucks.

Utility Services including a Water Supply collection, treatment and distribution system with 50 miles of service mains; a Steam Generation and Distribution system with 425,000 pounds of steam per hour generating capacity and 22 miles of overhead and underground service mains; an Electric Light and Power system with 10,000 KW of 60 cycle, 13,800 volt, generating capacity and 150 miles of distribution, highway and group protective lighting circuits; a 600 station automatic dial Telephone Exchange; and two Sewerage Collection and Disposal plants with 22 miles of service mains

Maintenance Facilities including shops equipped with modern tools and appliances for all types of repair and maintenance work, and for the manufacture of tools, gauges, fixtures and special equipment required in loading operations

Administration Facilities - 106 buildings and employee dwellings containing approximately 383,000 square feet, nearly 9 acres, of gross floor area.

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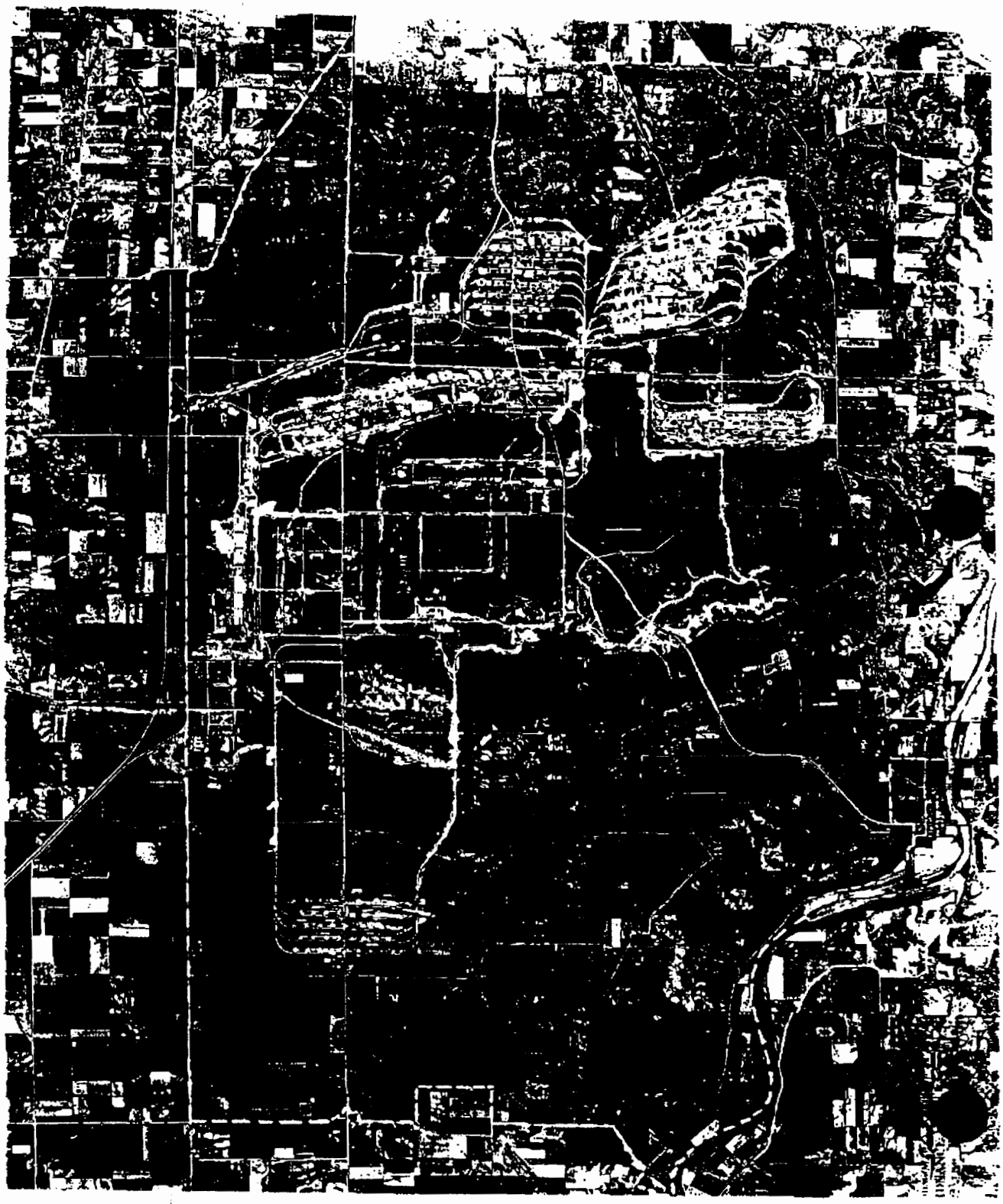

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Direct railroad transportation service is furnished by the Chicago, Burlington & Quincy railroad and connection is made at Burlington with the Chicago, Rock Island & Pacific Railway. The main line tracks of the "Burlington" and U.S. Route 34 extend along a part of the northerly boundary of the reservation; State Highway Route 80 provides access to the Plant on the east and State Highway Route 16 furnishes access through the village of Augusta on the south. Sections of Highways 34 and 80 leading to the Plant were widened for four lane traffic by the State of Iowa.

The operating groups and storage areas occupy over 4,000 acres of the tract and they are enclosed with 43 miles of 6 feet high cyclone type steel fence. Approximately 10 miles of the property boundaries fronting along Highways 34 and 80 are enclosed with the same type of fencing and the remaining 18 miles are protected by 4-strand barbed wire on wood posts.

Manufacturing, storage, service and administration buildings total 853 in number, 3,647,000 square feet or 84 acres in floor area and 63,606,000 cubic feet in volume.

Design of the Plant was started about the middle of November, 1940 and construction began in January of 1941. By January 15, there were 1,000 men on the construction pay rolls, the number increased gradually to 11,000 at the peak of employment in July, and the Construction Contractors completed their work at the end of February, 1942 with the expenditure of substantially 17 million manhours of labor exclusive of labor used by subcontractors.

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ACQUISITION OF LAND

The Plantsite was acquired by the Office of the Quartermaster General through contracts with A. J. Cockrell of Burlington covering negotiation of purchase options and a contract with John J. Wagner of Cedar Rapids, Iowa, covering an appraisal of the lands. To assist in the negotiations, Mr. Cockrell employed members of two Burlington law firms, local real estate brokers and an office and clerical staff.

The tract contains 20,456 acres gross, 19,589 acres net, and was acquired from 206 separate owners, 200 through friendly negotiations and 6 through condemnation proceedings.

The following account of procedures employed and difficulties experienced in acquiring the land is based, in part, on analyses of the terms of the formal contracts between the Government and the realtors and, in part, on a statement prepared for the purpose of this history by Messrs. Kuhlemeier, Poor, Fischer & Cray, one of the two law firms that assisted in the negotiations.

Original Negotiations:

On or about November 6, 1940 Colonel R. D. Valiant, of the Office of the Quartermaster General, held a conference with a committee representing the City of Burlington on location of the Iowa Ordnance Plant at which time the committee recommended A. J. Cockrell, a Burlington realtor, as purchasing agent.

Conferences were arranged between the Colonel, Mr. Cockrell and members of two local law firms and Mr. Cockrell made a contract with the Government dated November 7, 1940 that provided, among other things, the following -

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The "Optioner" with a competent force of experienced men will exhaust every reasonable effort to acquire within 45 days options for the 20,800 acres of land, more or less, at the reasonable value of the land to be acquired, the Government reserving the exclusive right to accept or reject any option.

Sole compensation for services and all expenses shall be 5 per cent commission to be paid by vendor.

On November 7th a meeting was held in a church in the area and the Colonel informed the residents and farmers that the tract was to be acquired and the Plant constructed forthwith, and he outlined the procedure that was to be followed in the negotiations.

Mr. Cockrell opened an office in Burlington and engaged a staff of assistants; the necessary legal forms were prepared and copies forwarded to Washington; and residents and farmers of the area were notified by letter that negotiations would begin at once.

Options acquired were periodically forwarded to Washington for approval, and trespass agreements to admit engineers, surveyors and construction men to the lands were obtained. It is stated that, by the early part of December, many options had been forwarded and few accepted for the reason that the prices were considered excessive. Landowners complained the values were low and protested to the Office of the Quartermaster General, their Congressmen and Senators.

Appraisal of Lands:

On December 6, 1940 John J. Wagner, real estate operator of Cedar Rapids, Iowa, was engaged under contract by the Office of the Quartermaster General to appraise the lands and Mr. Cockrell was instructed to discontinue taking options pending completion of the appraisal.

The Wagner contract provided, among other things, that:

The Appraiser prepare and furnish to the Government a separate appraisal of the "present fair market value" of each parcel of land, the appraisal to include complete description of land and improvements, unit of land valuation, value of improvements, and total value of property.

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Appraiser proceed at once and diligently present

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Government pay the sum of * * * * dollars upon completion of appraisal.

Supplemental Contract with A. J. Cockrell:

The original contract between Mr. Cockrell and the Government was amended and supplemented by agreement dated February 19, 1941 that provided the "Optioner" continue to obtain satisfactory options on a basis briefly stated as follows:

Optioner be permitted to retain commissions on 10 options which have been accepted, closed and purchase prices paid.

Commissions on all other options procured to be 3-1/2 per cent of net price paid landowner, such commission to be full consideration for all services rendered, or to be rendered, in procurement of title certificates and other title evidence.

Options already accepted by Government on which purchase prices have not been paid will be closed by Government Field Representative at option prices and commissions of 3-1/2 per cent.

Under the original Cockrell contract, it was agreed that all land would be under option within 45 days, or by the end of the third week in December. At about the time the Wagner appraisal was ordered, it was stated that from 75 to 85 per cent of the land was under option. While records are not available to substantiate this claim Mr. Wagner advised the Department of Justice by letter of April 29, 1941 to the effect that 151 of the 200 parcels had been optioned prior to the appraisal. Records indicate that 26 options covering 3,205 acres, or 16.4 per cent of the total, were signed between November 14th and 26th, of which 2 were accepted on December 21st and the others, some of which were renegotiated, were accepted during January, February

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The Wagner contract contained no time limitation but provided the work would be diligently prosecuted without interruption and the appraisal and report, when completed, would be delivered to the Quartermaster General in Washington.

At conferences held about December 10, 1940, it developed that Mr. Wagner expected to submit his report in about three weeks' time after which the figures would be reviewed by the Quartermaster General and Mr. Cockrell would be furnished with acceptable purchase prices and further instructed. It was also developed that the Wagner appraisal and report were to be made entirely independent of Mr. Cockrell's work in negotiating options up to that time. It was agreed by the Commanding Officer, the Constructing Quartermaster, Day & Zimmermann, Inc. and others that the construction program would be unnecessarily retarded by delaying option negotiations until after the completed appraisal and report were submitted, even though the three weeks' schedule, which appeared optimistic, were met. The Offices of the Chief of Ordnance and the Quartermaster General were so advised by letter and telephone. Accordingly agreements were made whereby Mr. Wagner appraised and Mr. Cockrell negotiated, or renegotiated, options on lands required in order of importance from the standpoints of railroad connections and classification yards, construction headquarters and space needed to handle construction materials and equipment, operating group and storage area locations, etc.

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At the time the options were negotiated, trespass permits

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were real handicaps in making topographical surveys, in laying out construction work, in the handling and storing of construction materials and equipment, and in the performance of the actual construction.

The manner in which the lands were acquired, based on dates options were accepted by the Government, is indicated by the following:

		Number Options	Acres
Accepted in December	1940	2	210
Accepted in January	1941	88	8,944
Accepted in February	1941	42	3,957
Accepted in March	1941	40	3,860
Accepted after March	1941	28	1,979
Total Negotiated		200	18,950
Condemnations		6	638
Totals		206	19,588

Data furnishing the basis for the above statement are contained in letter of March 1, 1941 by Mr. Cockrell to Day & Zimmermann, Inc., a reproduction of which is included in Appendix Volume 2, pages 171 and subsequent.

By letter of April 29, 1941, Mr. Wagner advised John J. O'Brien (of the Department of Justice) to the effect that the appraised values for 151 parcels optioned at the time the appraisal was ordered totaled $2,460,360 against option prices aggregating $3,930,808. This letter and one prepared for the purposes of this history by Mr. Wagner dated September 7, 1943

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DESCRIPTION OF THE PLANT

In general terms, the Iowa Ordnance Plant comprises the following:

A tract of approximately 20,450 acres of former farm lands situated in southeastern Iowa about 5 miles west of the City of Burlington served by the Chicago, Burlington & Quincy Railroad.

4 shell and bomb loading groups designed to load medium calibre shells and medium to heavy bombs at rates in excess of 10 million pounds of high explosives per month.

A plant for the conversion of neutral Ammonium Nitrate liquor to crystals at the rate of approximately 400,000 pounds per day.

A plant for reclaiming explosives for reprocessing from medium calibre shells and bombs.

7 lines for assembling and loading detonators, boosters, fuzes, artillery primers and percussion elements and a plant for fabricating metal parts for detonators.

36 inert material warehouses, 34 in one and 2 in a second group, with 891,350 square feet, over 20 acres, of gross floor area.

119 high explosive storage magazines, 115 igloos and 4 vaults in five separate areas with 169,575 square feet, nearly 4 acres, of floor space.

190 finished ammunition magazines, 156 igloos and 34 warehouses, in five separate areas with 621,475 square feet, over 14 acres, of floor space.

100 miles of standard gauge railroad trackage with 8 Diesel-electric locomotives, 181 box and work cars, and service and repair facilities.

100 miles of stone surfaced primary and secondary highways and group patrol roads, together with a fleet of 276 automobile trucks and cars of all types.

A water supply system comprising a 480 million gallon capacity storage reservoir on Long Creek, a tributary of the Skunk River, a 19 million gallon capacity settling and emergency supply reservoir, 9 elevated steel storage tanks of 100,000 gallons capacity each, a treat-

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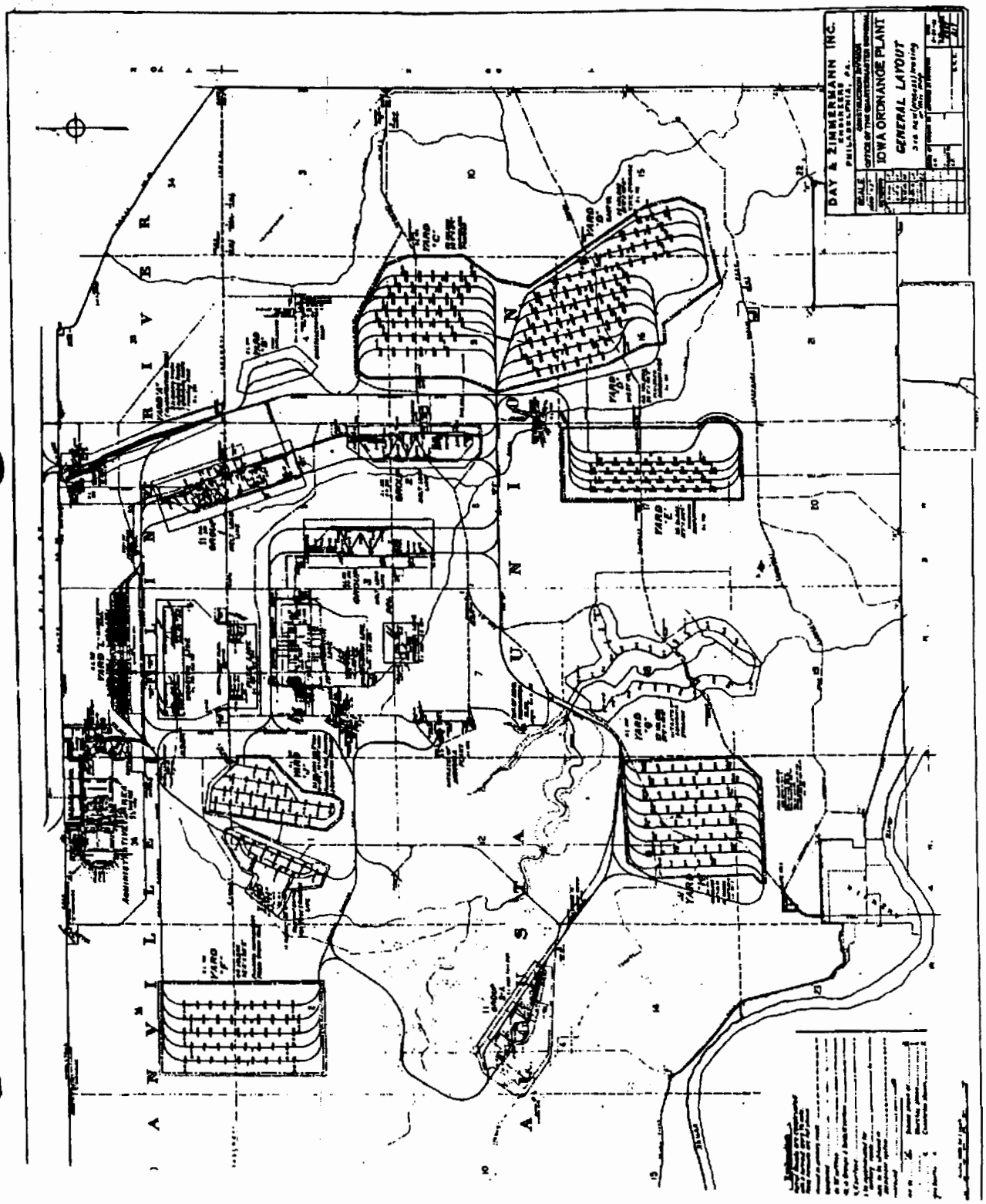

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4 separate steam generation and distribution systems including plants totaling 425,000 pounds of steam per hour nominal rated capacity and 22 miles of overhead service mains.

A system of 13,800 volt, 3 phase, 60 cycle electric generation and distribution including 10,000 kw of steam turbine operated generators; 5.7 miles of double circuit 33,000 volt, 3 phase transmission line and 2810 KVA of 25 to 60 cycle frequency changer capacity connected for emergency service with the 25 cycle system of the Mississippi River Power Company; 63 miles of 13,800 and 2400 volt primary and secondary distribution circuits; and 81 miles of series highway and group protective lighting circuits.

A Communications system with a 600 station automatic dial exchange; manual boards for fire, guard, train dispatching and hospital service; and short wave radio sets for guard and fire cars.

2 sanitary sewerage collection and disposal systems with 22 miles of service mains designed to serve populations of 5,500 and 600 respectively.

A shop equipped with modern tools and appliances for all types of repair and maintenance work and for the manufacture of tools, gauges, fixtures and special equipment required in loading and assembling shells, bombs, fuzes and other component parts.

A group of 106 Administration Area buildings, employee dwellings and barracks, cafeteria, etc. containing approximately 383,000 square feet, nearly 9 acres, of gross floor space.

The operating groups and storage areas occupy over 4,100 acres of the tract and are enclosed with 43 miles of 6 feet high cyclone type steel fencing. Approximately 19 miles of the northerly and northeasterly boundaries fronting along Highways 34 and 80 are enclosed with the same type of fencing and the remaining 18 miles are protected by 4 strand barbed wire on wood posts. There are six entrance gates to the general area and from one to three to the various operating groups and storage areas. Continuous

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SHELL AND BOMB GROUPS

The Shell and Bomb Groups include Groups 1, 2, 3 and 3A, the Ammonium Nitrate Crystallizing Plant and the Renovation Plant. They are situated in separate restricted areas totaling 635 acres and comprise 141 buildings and 5-1/4 miles of connecting ramps totaling substantially 1,007,000 square feet (23 acres) in floor area and 16,351,000 cubic feet in volume.

Type of Construction

Groups 1, 2 and 3 are of the same type of construction. In general, the buildings are single story with double pitched roofs, and are constructed with reinforced concrete foundation walls and footings, 6 inch reinforced concrete floors on compacted earth fill at car platform levels, 8 inch tile walls, structural steel columns, roof trusses and roof framing, steel sash and doors, and corrugated asbestos roofing. Certain buildings are constructed with self-supporting reinforced concrete floors to avoid excessive earth floor fill.

The melt load buildings have a single story cooling bay section and a three story melt and drawoff section. The second and third floors are of reinforced concrete beam and girder construction. The melt and drawoff section is separated from the cooling bays and the individual cooling bays are separated by 12 inch reinforced concrete walls.

Ramps between buildings of Groups 1, 2 and 3 have reinforced concrete footings, piers and floors; structural steel wall and roof framing, steel sash and doors, and corrugated asbestos wall and roof covering.

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The types of construction of Group 3A, the Ammonium Nitrate Plant and the Renovation Plant are discussed in sections devoted to the respective units.

Melt Load Building Process Steam

Melt Load building process steam is supplied from the 150 pound pressure steam distribution mains through two independently controlled piping systems as follows:

150 pounds pressure reduced to 70 pounds in one step and from 70 to 2-5 pounds in a second step, by means of two dual systems of reducing valves, supply steam for melt unit grids and for heat exchangers providing hot water for melt unit reservoir jackets and amatol mixing kettle jackets.

150 pounds pressure reduced to 5-20 pounds in one step by means of a dual system of reducing valves supplying Ammonium Nitrate preheater jackets.

Group 3 mixing kettle jackets are provided with connections so that either water or steam can be used for heating.

The 2-5 pounds pressure system is provided with a water leg connected to the supply riser and with "pop" type pressure relief valves on the manifold leading into the supply riser and on manifolds that directly supply the melt units.

The water leg is an upright U-shaped tube with legs 7 and 13 feet long. The top of the shorter leg is connected to the 5 pound steam riser with a swing check valve in the connection, the latter to prevent water from entering the riser. A water connection for filling is provided at the top of the short leg and a sight glass is located about half way up the longer leg for determining when sufficient water has been admitted to the tube. When

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steam pressure reaches 5.65 pounds, the water is blown and the steam escapes to the atmosphere.

The 5-20 pounds pressure system supplying the Ammonium Nitrate preheaters has been operated at 5 pounds pressure since the early part of February 1942, and the system is provided with "pop" type pressure relief valves on the manifold leading into the supply riser and the line directly supplying the units.

A schematic layout of the process steam controls in Melt Load buildings is shown on Drawing FSE 319 reproduced opposite this page.

Melt Load Building Ventilation

Melt Load buildings are partially ventilated by means of fresh air drawn from the outside through filters and distributed through overhead ducts. During the cold weather season, the air is heated to approximately 70 degrees by means of thermostatically controlled steam coils. The system was originally designed to exhaust air from the building, but was never so operated due to the possible accumulation of TNT in the ducts and fan.

The continuous melt units, the mixing kettles and the Ammonium Nitrate preheaters are all equipped with individual exhaust vents extending in straight runs through the roof. Air is induced into the vents through jets to aid in carrying off fumes.

Building Heating

All buildings of Groups 1, 2 and 3 are heated, excepting service magazines, ramps and recently constructed car loading platforms. Melt Load buildings are heated by hot water radiation and

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other buildings by wall type radiators or overhead unit heaters supplied by steam.

Automatic Sprinklers

All buildings of Groups 1, 2 and 3 are equipped with automatic sprinklers, excepting service magazines and ramps, unheated portions of inert storage buildings, the newly constructed car loading platforms, and the recent addition to Building 1-12.

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GROUP 1

Group 1 was designed, constructed and equipped for loading, assembling and shipping in standard gauge railroad cars:

750,000 fixed rounds of 75 mm high explosive or 3 inch anti-aircraft high explosive, or equivalent explosives capacity of other similar types on the basis of 500 working hours per month

The 750,000 fixed rounds per month of 75 mm require the loading of 1,200,000 pounds of high explosive exclusive of propellent charge and waste.

From the beginning of regular operations in September 1941 up to and including September 1943, the Group loaded 11,471,569 rounds of the following calibres and types at rates appreciably in excess of the designed capacity:

3 inch Gun
75 mm M48 Gun & Howitzer
81 mm M56
105 mm M2 Howitzer
155 mm M101
Anti-Tank Mines

The Group comprises 45 buildings and over 1-1/2 miles of connecting conveyor ramps totaling 313,265 square feet, or 7.2 acres, in gross floor area and 4,817,340 cubic feet in volume. The buildings extend over an area between fence lines of 1,580 x 4,850 feet, or 175 acres, in the north central part of the reservation.

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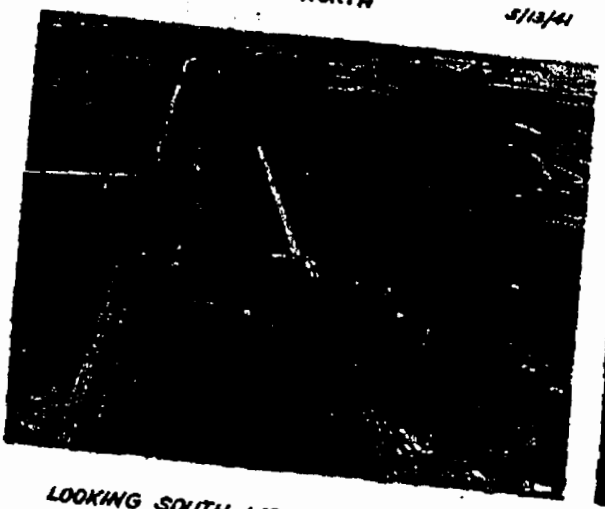
IOWA ORDNANCE PLANT
GROUP I CONSTRUCTION-AIR VIEWS

FROM THE NORTH 5/13/41

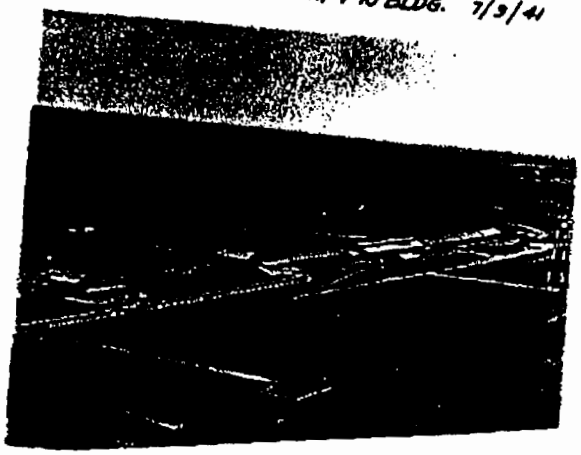
MELT BLDG. FOUNDATIONS 5/11/41



LOOKING SOUTH, I-10, I-12, I-53 BLDG. 6/15/41

LOOKING NORTH FROM I-10 BLDG. 7/3/41

LOOKING SOUTHWEST



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Buildings

The more important buildings, their size and use are:

Number	Building and Use	Plan Dimensions in Feet
1-01	Inert Storage	52 x 501
1-04	Receiving and Painting	66 x 341
1-05-2	Melt Loading	66 x 129 and
1-05-1	Melt Loading	60 x 88
1-50	TNT Screening	46 x 57
1-08-1	TNT Storage	36 x 40
1-08-2	TNT Storage	36 x 40
1-06-1	Ammonium Nitrate Storage	36 x 40
1-06-2	Ammonium Nitrate Storage	36 x 40
1-10	Drilling and Boostering	66 x 357
1-16	Booster Storage	28 x 32
1-12	Assembly and Packing	66 x 416
1-17	Fuze Storage	28 x 32
1-13	Propellent Charge	106 x 389
1-14	Primer Storage	28 x 32
1-15	Smokeless Powder Storage	66 x 136
1-53	Shipping	56 x 66
1-52	Office	31 x 61

Other structures of the Group include: a steam generating and air compressor station, a paint storage and mixing building, a maintenance shop, a shell sectionalizing building, 11 earth covered reinforced concrete bomb proofs, 3 change houses and 4 entrance gate houses.

Equipment

The principal equipment of the Group is briefly described by buildings as follows:

1-01 Inert Storage -

Portable, motor-driven belt conveyors for moving shells packed in paper cartons from railroad cars into building

Alvey-Ferguson shell washing and drying machine for cleaning both interior and exterior of shells, using continuously circulated hot water, capacity 2,000 shells per hour

A 12 inch wide trough-type belt conveyor for moving shells through 1-01 and into 1-04 traveling at 60 feet per minute

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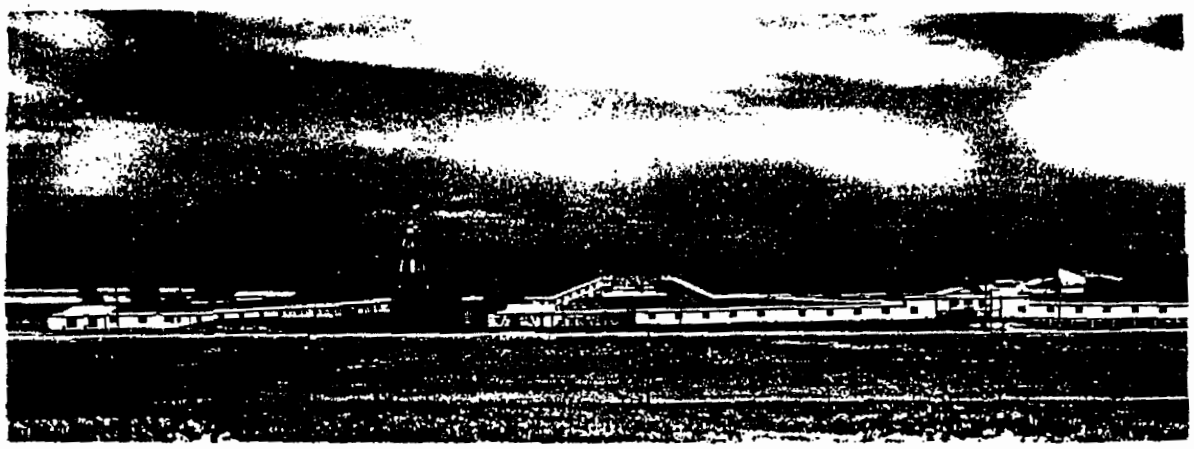
IOWA ORDNANCE PLANT
GROUP I



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1-04 Receiving and Painting -

4 De Vilbiss automatic paint spraying and drying machines with water wash spray booths and continuous system of paint supply for painting shell exteriors, each machine equipped with 256 spindles on continuous conveyor traveling at 16-2/3 feet per minute, capacity 1,000 shells or 500 anti-tank mines per hour

Roller conveyor racks with capacity for storing up to 195 skids of painted shells, 14,040 shells of 3 inch, 75 mm and 81 mm calibres and 3,900 anti-tank mines

1-05-2 Melt Load -

4 Read or Robinson Ammonium Nitrate preheaters, 80 gallons capacity, belt driven

3 Ogden Iron Works 16-grid continuous melt units with valves and hoods rebuilt by Plant maintenance forces, grid heated by steam not over 5 pounds pressure and reservoir heated by water

2 Sowers amatol mixing kettles, 150 gallons capacity, hot water heated jacket, belt-driven rotor

1-05-1 Melt Load - Same as for 1-05-2

1-50 TNT Screening -

2 Robinson Mfg. Co. "unique gyro sifters", motor-driven, equipped with 0.2 x 0.5 inch mesh screens, each rated at approximately 10,000 pounds per hour

1-10 Drilling and Boostering -

15 bays equipped with horizontal drills manufactured by Sipp-Eastwood Corp., G. S. Blakeslee thread cleaning machines, Thor pneumatic fin driving machines, Thor pneumatic staking tools, etc. All equipment belt-driven by air motors, bays equipped with vacuum cleaning systems

1-12 Assembly and Packing -

Bays largely equipped with special fixtures and tables made in Plant maintenance shops for assembly and packing operations of various types and calibres handled and 10 air-operated machines made by Canister Company for crimping

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1-13 Propellent Charge -

3 Consolidated Packaging Corp. automatic measuring and weighing machines each of 500 pounds per hour capacity for weighing smokeless powder propellent charges

64 Exact Weight Scale Co. shadow indicating scales for weighing smokeless powder increments

3 Exact Weight Scale Co. mechanical type increment selectors, each rated at 2,400 increments per hour

8 Greenerd No. 22 hand-operated arbor presses for inserting primers in shell cases

The transfer of shells in wood racks on steel skids between buildings and the return of empty skids and racks is accomplished by two conveyor systems extending between buildings 1-04 and 1-12.

The conveyors were manufactured by the Alvey-Ferguson Company and are a combination of floor mounted gravity roller on which the skids ride and a continuous chain mounted on a monorail carrying pusher arms spaced 120 feet apart and supported by and traveling on guide rails at a speed of 60 feet per minute. The pusher arms engage the ends of the skids and move them along the roller conveyor, and turnout switches are provided for transferring skids on and off the conveyors.

Drawing 6987-2790 reproduced opposite this page shows sections through Melt Load Building 1-05-1 and the general locations of process equipment.

Loading Procedure for 81 mm Shells

Empty shells are cleaned and inspected in Inert Storage Building 1-01; they are painted, dried and placed in wooden racks on steel skids in Receiving and Painting Building 1-04; they are

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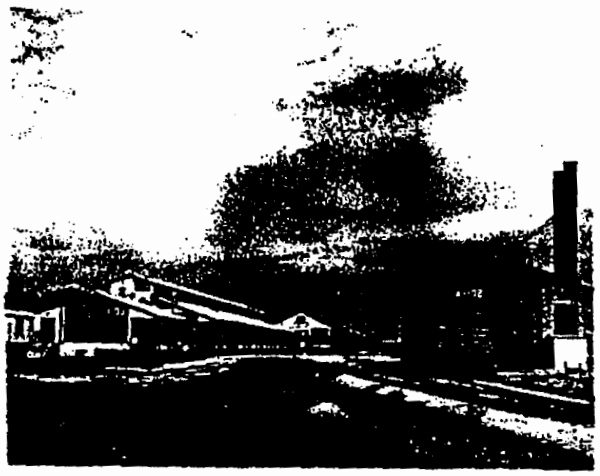
GROUP I



RECEIVING AND PAINTING BUILDING AND STEAM GENERATING PLANT

MELT BUILDING 1-05-2

CONVEYOR RAMP

REBUILT MELT BUILDING 1-05-1

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loaded with TNT and cooled in Melt Load Buildings 1-05-2 and/or 1-05-1; they are drilled for booster cavity, threads cleaned of excess TNT, fins attached, and stenciled in Drilling and Boostering Building 1-10; they are fuzed, gauged, propellent increments and ignition cartridges are inserted and they are placed in fiber containers, sealed with adhesive tape and made up in "clover-leafs" in the northerly bays of Assembly and Packing Building 1-12; the "clover-leafs" are crated in wood crates, stenciled, and strapped with wire in the large south bay of 1-12; the crates are moved by belt conveyor from 1-12 to the shipping platform recently constructed south of Building 1-53 and from the shipping platform they are loaded directly into railroad cars for transfer to storage or outbound shipment.

Propellent increments are check weighed and fibre containers are stenciled in Propellent Charge Building 1-13 and the increments and containers transferred by conveyor to Building 1-12.

TNT in boxes is moved by conveyor from TNT Storage Magazines 1-08-1 and 1-08-2 to TNT Screening Building 1-50, where it is visually inspected, screened, weighed, placed in aluminum or fiber containers, sealed and transferred by conveyor to Melt Load Buildings 1-05-1 and 1-05-2.

Historical

Concrete work started February 18, 1941, roofing and siding completed August 12, 1941.

Buildings with permanently installed equipment and other facilities accepted with exceptions from the Constructing Quartermaster between September 3 and October 22, 1941.

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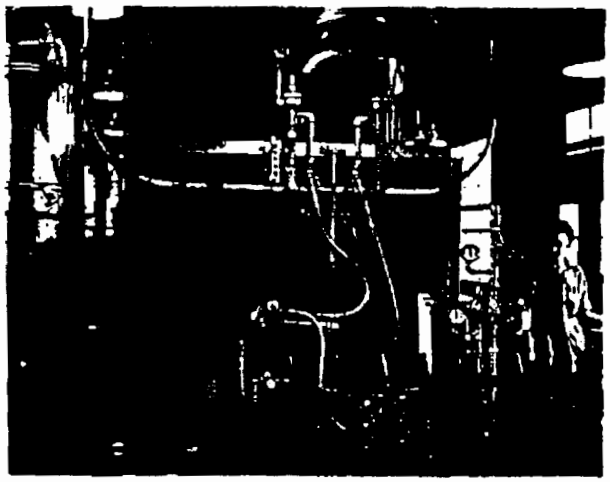
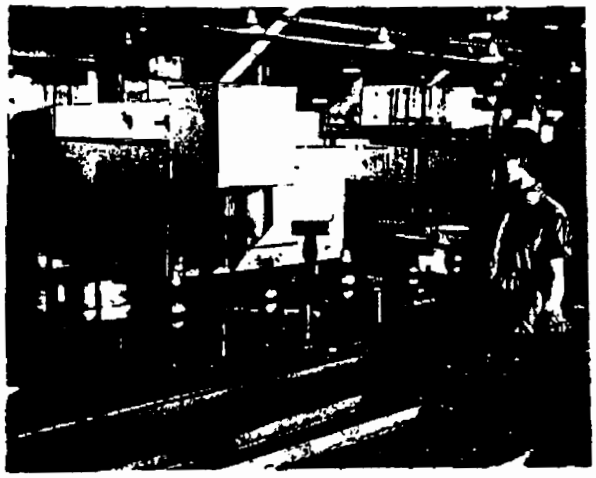
IOWA ORDNANCE PLANT
GROUP I

SHELL WASHING MACHINE

CONVEYOR BELT FROM I-01 TO I-04



SHELL PAINTING SPRAY BOOTH



REMOVING LAND MINES FROM OVEN

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Group inspected by Vice President Henry Wallace and others on July 31, 1941 at which time the Iowa Ordnance Plant was dedicated. At the time trainees were engaged in practice loading of 81 mm M 43 shells with paraffine and barium carbonate.

Actual operations of the Group began by loading the following:

155 mm shells with Amatol on September 15 as a temporary measure under Production Order A 1357 assigned to Group 2.

81 mm M 43 shells with paraffine and barium carbonate on September 17 under Production Order A 1219A

81 mm M 43 shells with TNT on October 10 under Production Order A 1209A

Original Melt Load Building 1-05-1 was largely destroyed by explosion that occurred about noon on December 12, 1941. The building was rebuilt by contractors A. Guthrie & Co., Inc. and Al Johnson Construction Co. in substantially the original form, except that the TNT hopper section of the third floor was omitted, and the building was completed on May 22, 1942.

Wood frame additions to Change Houses 1-137-1 and 1-137-2 were constructed by Carl Nelson, Burlington contractor, under the direction of the Area Engineer and completed on August 15, 1942. By the additions, the buildings were increased in floor area from 4,170 to 12,913 square feet and, through rearrangement of space and change in type of equipment, locker room accommodations were appreciably increased.

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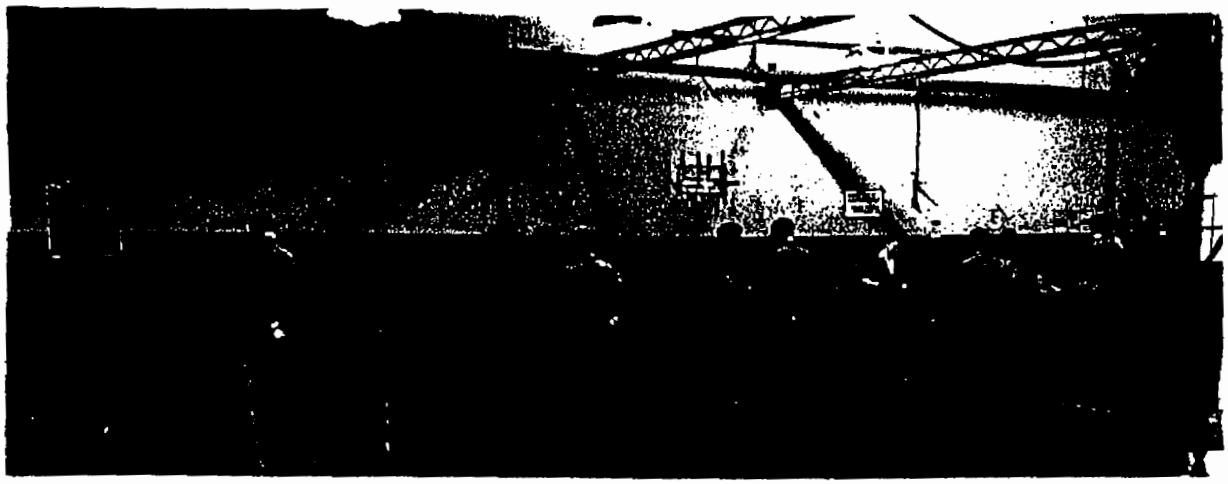
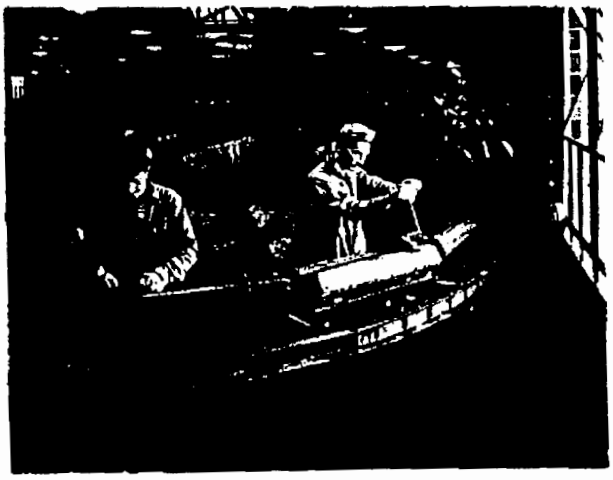


CRATING FIXED ROUNDS FOR OVERSEAS SHIPMENT



NAILING CRATES

BUNDLING CRATES

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Approximately 1,065 feet of wood frame enclosures over crushed stone walkways were constructed between change houses and manufacturing buildings by Plant maintenance forces during the early part of 1943 under I.O.P. Project No. 5.

A reinforced concrete sectionalizing building No. 1-188-1 and a wood frame control house, together with sectionalizing and control equipment were installed by Plant maintenance forces under I.O.P. Project No. 1 and placed in operation on January 1, 1943.

Ordnance Department Safety Bulletin No. 43, dated October 9, 1942, changed paragraph 45c of the Ordnance Safety Manual effecting reductions in explosive limits for shipping buildings. In order to meet the changed condition when shipping boxed anti-tank mines, a spur track, a timber and earth fill barricade and a wood frame car loading platform were constructed by Plant maintenance forces in March 1943 under I.O.P. Project No. 35.

TNT conveyor and supporting ramp at Melt Load Building 1-05-2 was lowered from the third to second floor during July 1943 under I.O.P. Project No. 45.

A concrete floor on earth fill and wood frame extension to Building 1-12, 66 x 187 feet in plan, was completed by Plant maintenance forces early in September 1943 under I.O.P. Project No. 48. The addition was required for storage and assembly space for crating for overseas shipment.

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Item No.	Nomenclature	Quantity
75-5	75mm Smoke Shell, Mk II	1
75-21	75mm Shot, AP, M72	145
75-13	75mm Proj., APC, M61	40
75-12	75mm Shrapnel, MkI	2,022
75-2	75mm HE Shell, Mk I	3,418
75-28	75mm Pract., Mk I	1
76-5	76mm AP, Shot, M79	1
76-5	76mm APC, M62	5
81-1	81mm Smoke Shell, M57	700
90-3	90mm Shot AP, M77	2
105-11	105mm HE Shell, T17E1	38,224
105-11	105mm HE Shell, T17E1 w/o Fin	4

Previously, the Line had processed 75mm, M48 gun and howitzer shells, 105mm shells and 81mm mortar shells of the M43A1 and M56 types. Tools and equipment for handling these items were available to a certain extent within the Line but to a greater extent in scattered warehouses. Considerable time was spent in locating, assembling, and putting this equipment in a condition to be used.

Samples of the items with which the Line had no previous experience were secured for the purpose of determining what additional tools and equipment would be required. When the determination was made, orders were placed with the Post Engineers for the manufacture of the necessary equipment.

Demilitarization operations officially began on 22 April with work on the 105mm, HE, Shell, T17E1, which project consisted of 38,228

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rounds. A total of 660 rounds were processed the first day, and daily production gradually reached a peak of 2,820 rounds. The project was completed 15 May.

All tools and equipment were on hand when work began on the 75mm items, but last-minute instructions from FDAP made it necessary to secure additional equipment. The original instructions had been to the effect that the primers were to be fired in the cartridge cases. After removal of the fired primers, the cartridge cases were to be sent to salvage. According to the new instructions, the primers were to be backed out of the cartridge case unfired. The primers were to be destroyed in the destruction chamber and the cartridge cases retained as war reserve stock. This occasioned considerable delay since it was necessary to devise a suitable machine for ejecting the primer. A specially equipped arbor press was used. A perforated guide was made to fit over the primer, the top resting against the inside of the base of the cartridge case. A spring was fitted on the bottom of the guide to allow it to come down when the case was depressed. The end of the primer rested on a stationary anvil inside the guide. When the case was depressed, the anvil backed out the primer. Anvils of different lengths were used to accomodate the different lengths of primers. This set-up worked reasonably well, the chief difficulty being a tendency of the primers to mushroom.

There was considerable difficulty in getting shells into the Line. This was apparently due to the fact that the location of

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PLANT FACILITIES

The Iowa Ordnance Plant is a Class II industrial installation under the command of the Chief of Ordnance and the Commanding General, Ordnance Ammunition Center, by authority of Ordnance Corps Order 34-51, paragraph 2(b), dated 1 June 1951.

The Plant covers an area of approximately 20,000 acres and is located 9½ miles west of Burlington, Iowa on U.S. Route 34.

During the period covered by this historical summary, plant facilities included five ammunition component lines, four large shell and bomb loading lines, one ammunition renovation plant and a plant for the production of ammonium nitrate. There were seven large areas containing igloo magazines in which ammunition, loaded components and explosives were stored. An above-ground storage magazine area contained 34 standard ammunition magazines, 18 of which were used for the storage of finished ammunition.(1)

The Plant also had a railroad classification yard and another railroad area in which ammunition was stored temporarily.

The inert storage area, locally referred to as "Yard L", consisted of 34 large warehouses.

The Administration Area, in addition to the administration building itself, contained a large number of residences, several apartment houses, and a group of barracks, the latter being used to house bachelor personnel. This area also included the light

(1) See chapter on "Long Term Storage".

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and heavy machine shops, a garage and recreational facilities which included a recreation hall and a swimming pool.

The manufacturing facilities were located in groups of buildings, each individual building in each group having a definite purpose and use having to do with the production of artillery ammunition and bombs. These buildings were of permanent type construction.

Late in 1947, the facilities of Group I, previously devoted to the loading of shells and land mines, were taken over by the Atomic Energy Commission with the Silas Mason Co. as operating contractor, and from that time the Group ceased to play a part in the general production activities of the Plant.

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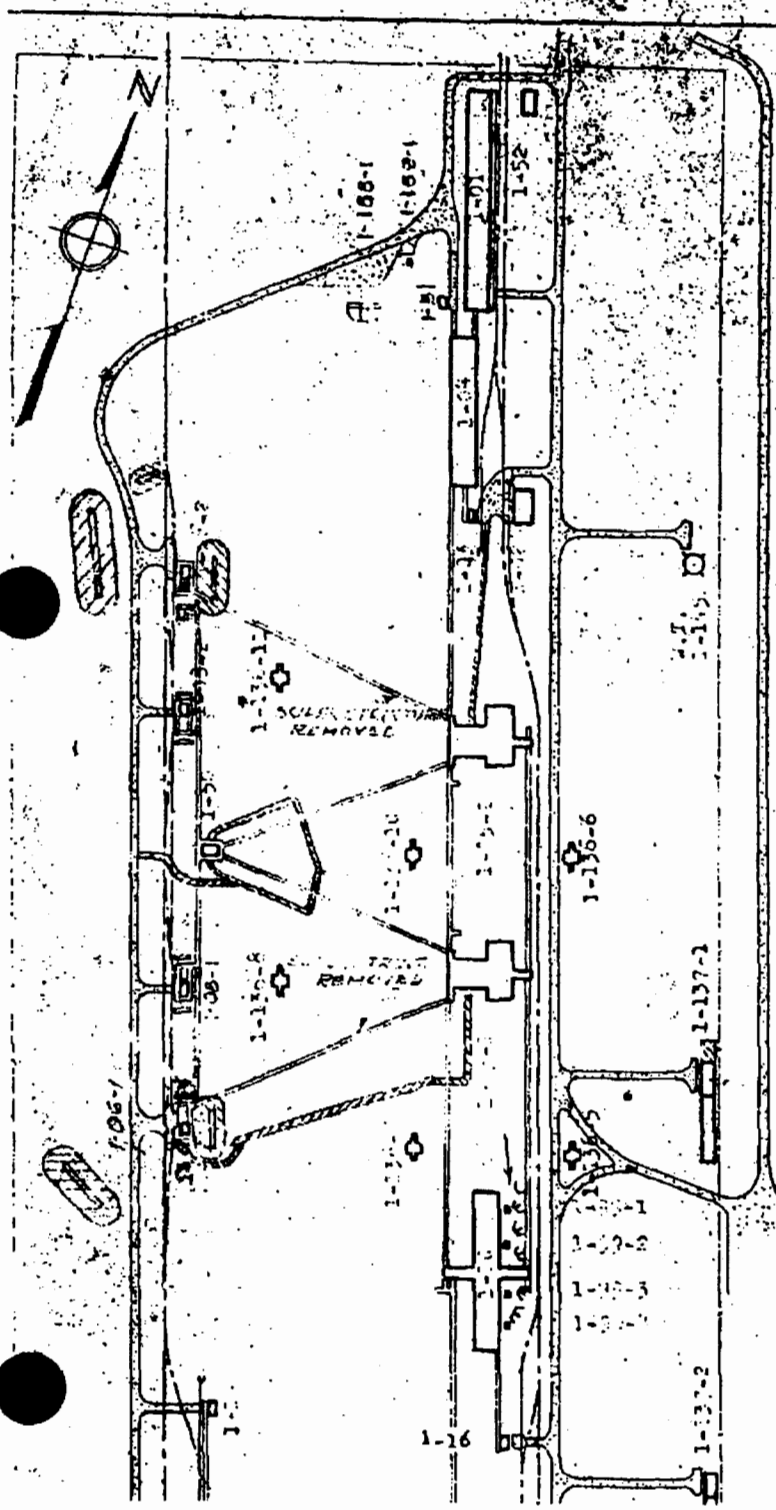

1-52	Office
1-01	Inert Storage
1-51	Elect. Battery Service
1-04	Receiving & Painting
1-03	Paint & Oil Storage
1-02	Power House
1-05-2	Melt Loading
1-05-1	Melt Loading
1-06-1	Amm. Nit. Ser.
1-06-2	Amm. Nit. Ser.
1-08-1	TNT Ser. Mag.
1-08-2	TNT Ser. Mag.
1-50	TNT Screening
1-10	Drilling & Boostering
1-99-1)	
1-99-2)	Vac. Pump Houses
1-99-3)	
1-99-4)	
1-16	Booster Service
1-17	Fuze Service
1-13	Propellent Charge
1-12	Assembly & Packing
1-53	Shipping
1-15	Smokeless Powder Storage
1-137-1	Change House
1-137-2	Change House
1-145	Water Tower
1-136-1 to 1-136-11 Incl.	Bombproofs
1-14	Primer Ser. Mag.
1-188-1	Sectionalizing Bldg.
1-189-1	Sectionalizing Control Bldg.

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GROUP I
1946

There was no activity in the Group from 1 January to 4 April. On the latter date orders were received to place the Line in condition for the demilitarization of ammunition, and the following projects were authorized:

Item No.	Nomenclature	Quantity
20-7	20mm HE Cartridge	385
37-13	37mm Mk I, M1916, unfixed	4
37-13	37mm M4, w/M56 Fuze	542
37-13	37mm M63, w/M58 Fuze	41
37-17	37mm Mk I, M1916, sand loaded	3
37-16	37mm Mk I, M1916, LE, unfixed	65
37-5	37mm M55A1, Practice	249
37-4	37mm M54, HE Shell	8,582
37-7	37mm AP, M80	60
37-9	37mm AP, M51	6
40-2	40mm HE, Mk II, Shell	246
57-4	57mm, AP, M70 Shot	31
3-2	3" HE, Mk IX	1,365
3-15	3" HE, M42	2
3-5	3" Shrapnel, Mk I	3,346
75-7	75mm HE Shell, M48 Gun	2,400
75-17	75mm HE Shell, M48 How.	1,155
75-27	75mm HE Shell, Unidentified	43
75-10	75mm HE Shell only	2

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the various items could not be readily established. This situation forced the transfer of personnel on some occasions.

Operations were also hampered by the fact that items brought into the Line were so badly mixed that considerable time was lost in the task of sorting them.

During the week of 7 June, the checkers notified the superintendent that all of the shells they had been able to locate had been delivered to the Line for processing.

By 28 June, all authorized operations had been completed and the Line was placed on a standby status.

Sources: Reports of Line Superintendent to Commanding Officer and Chief Inspector.

Project File

Operations File

Filed at IOP

DIRECT LABOR COST, DEMILITARIZATION IN GROUP I

Item	Nomenclature	Quantity	Total Cost	Unit Cost	Manhours
20-7	20mm HE Cartridges	383	$ .88	$ .0023	1
37-13	37mm HE M54, M63, & M1916	597	1.76	.0029	2
37-17	37mm Mk I, 1919 Sand load	3	1.76	.58	2
37-16	37mm Mk I L.E. M1916	65	1.76	.027	2
37-5	37mm M55A1, Practice	249	14.96	.06	17
37-4	37mm M54 HE Shell	8582	445.28	.0518	506
37-7	37mm AP M80	60	1.76	.03	2
37-9	37mm AP M51	6	1.76	.29	2
40-2	40mm HE Mk II	238	14.96	.0628	17
57-4	57mm AP M70 Shot	31	.88	.0283	1
3-2	3" HE Mk IX	1374	92.40	.0672	105
3-15	3" HE M42	2	.88	.44	1
3-5	3" Shrapnel Mk I	3346	450.56	.1346	512
75-7	75mm HE M48 Gun	2400	875.15	.3229	994.5
75-17	75mm HE M48 Howitzer	1155	416.68	.36	473.5
75-27	75mm HE Unidentified	38	3.52	.0928	4
75-10	75mm HE Unidentified Shell only	4	.00	.00	0
75-5	75mm Smoke Shell Mk II	1	.88	.88	1
75-21	75mm Shot AP M72	140	7.92	.0423	9
75-13	75mm Proj. APC M61	40	4.40	.11	5
75-12	75mm Shrapnel Mk I	2022	398.64	.1971	453
75-2	75mm HE Shell Mk I	3418	880.00	.2545	1000
75-28	75mm Mk I Practice	1	.88	.88	1
76-5	76mm AP Shot M79 & M62	6	2.64	.33	3
81-1	81mm Smoke M57	700	80.08	.1144	91
90-3	90mm Shot AP M77	3	.88	.2933	1
105-11	105mm HE Shell, T17E1	38228	3704.80	.102	4210
	105mm Cartridge Case only	2555	75.68	.0296	86
			$7481.76		8502
	Firedrill		13.20		15
	Sorting & Classifying Ammunition		7.04		8
			$7502.00		8525

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