SUPPORTING SYSTEMS REPORT

MASTER PLAN
FUTURE DEVELOPMENT PLAN

KAWAKAMI AMMUNITION DEPOT
HIROSHIMA PREFECTURE, JAPAN

CONTRACT DOCUMENTS

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SECTION 1

INTRODUCTION

1.1 PURPOSE OF REPORT

This Supporting Systems Report is one of several documents that together constitute the updated Master Plan for Kawakami Ammunition Depot, a U.S. Army installation in Hiroshima Prefecture, Japan.

The companion planning documents are:

a) A report entitled "Analysis of Existing Facilities/Environmental Assessment Report," dated January 1983 (corrected June 1984).

b) "Building Information Schedule," dated January 1983.

c) "Basic Information Maps," 9 maps dated December 1983.

d) A report entitled "Analytical/Environmental Assessment Report," dated November 1986.

e) "Tabulation of Existing and Required Facilities," dated November 1986.

f) "Future Development Plans, Phase II," 3 plans dated March 1987 (corrected).

g) Supplementary "Future Development Plans, Phase III," 8 plans dated with this report.

Of unique concern to this study are summary accountings of existing supporting systems, their relation to proposed future projects and requirements for alterations and expansions to meet future demands. In particular, this report is to provide assistance in understanding the Supplementary Future Development Plans (item g above, described in the following section).

1.2 SUPPLEMENTARY FUTURE DEVELOPMENT PLANS

The studies of this Supporting Systems Report for Kawakami Ammunition Depot are to provide assistance in understanding the Supplementary Future Development Plans listed below:

a) Detailed Site Plan

b) General Road Plan

c) General Water and Heating Plan

d) General Sanitary Sewer and Storm Drainage Plan

e) General Electrical Plan

f) General Telephone System Plan

g) General Tree Cover Plan

These plans are concerned with showing existing conditions and future components and necessary changes of supporting systems associated with future requirements.

In the case of utilities systems the plans are not concerned with detailed lateral connections but rather new primary components or main lines and significant reroutals. This is due to the conceptual nature of the future plans and that the exact locations of the components of concern are subject to some variation.

1.3 ORGANIZATION OF REPORT

The Supporting Systems Report contains a series of studies on supporting utilities and other systems at Kawakami Ammunition Depot as listed below:

STUDY	SECTION
General Transportation Study	2.1
General Water Study	2.2
General Heating Study	2.3
General Sanitary Sewer Study	2.4
General Storm Drainage Study	2.5
General Electrical Study	2.6
General Telephone System Study	2.7

SECTION 2

SYSTEMS STUDIES

2.1 GENERAL TRANSPORTATION STUDY

2.1.1 General

Roads and streets are under the 850 Army construction category code series. Airfield pavements are under the 110 Army construction category code series.

Design of roads and pavements shall be in accordance with appropriate Government of Japan and U.S. Army criteria as applicable. The following list identifies the manuals of concern:

a) GOJ FIP "Design Criteria for Civil Engineering under the Facilities Improvement Projects," August 1983.

b) TM 5-822-1, "Traffic-Study Requirements," July 1965.

c) TM 5-822-2, "General Provisions and Geometric Design for Roads," April 1977.

d) TM 5-822-3, "Parking for Nonorganizational Vehicles," July 1965.

e) TM 5-822-5, "Flexible Pavements for Roads," May 1980.

f) TM 5-822-8, "Bituminous Pavements, Standard Practice," December 1971.

g) TM 5-823-2, "Airfield-Heliport Flexible Pavement Design," July 1965.

2.1.2 Existing Conditions

Kawakami Ammunition Depot has 178,345 square yards (SY) (18.4 linear miles) of asphalt concrete (AC) paved roads, and 5,231 SY (0.5 linear miles) of unpaved/gravel roads. Additionally, there are 13 vehicle bridges totaling 534 SY of road suface and 4,694 SY of paved parking. Most facilities on the installation are easily accessible by vehicles. Many roads, however, are worn and undersized.

The base has an AC helipad, approximately 2,000 square yards in scope, which provides service for skid mounted helicopters.

There are incomplete, unusable sections of railroad line on the base and an unused sidetrack spur, approximately 4,000 linear feet, extending from the Main Gate to Hachihonmatsu Station.

2.1.3 Future Developments

In JFY's 1988 through 1990 (GOJ FIP), plans for 38,750 square yards of new and reconstructed paved roads are to be implemented. These roads consist of approximately 19,500 linear feet throughout the Depot. They are necessary to replace existing substandard roads and to provide access to facilities. Additionally, the future construction of new ammunition igloos will include new access roads.

The sidetrack railway spur, from the Main Gate to Hachihonmatsu Station is proposed to be released from U.S. Government use and the remaining sections of unused railroad line on the base are being removed incrementally.

2.1.4 Design Considerations

The primary artery running through the central part of the installation is a flat terrain construction. Some of the supplementary secondary roadways, though, are on rolling terrain and a few of the tertiary access roads qualify as mountainous construction.

For design purposes, the traffic composition at most locations on the base is Category III — traffic including small trucks and a few heavy trucks in addition to passenger cars (reference TM 5-822-5).

The Design Index, Varing from 1 through 10 (reference TM 5-822-5), is based on road Category and Class and is used in conjunction with the existing subgrade CBR to determine required asphalt pavement thickness.

Various factors are involved in determining geometric design requirements as shown in Tables 1 and 2 of TM 5-822-2.

2.2 GENERAL WATER STUDY

2.2.1 General

Water works are under the 840 Army construction category code series.

Design of water supply treatment, storage and distribution systems shall be based on the appropriate Army Technical Manuals and Government of Japan criteria as applicable. Fire protection concerns as pertaining to water systems shall be in accordance with Department of Defense, GOJ and Army Standards. The following list identifies the manuals of concern:

a) MIL-HDBK-1008, "Fire Protection for Facilities — Engineering, Design, and Construction," April 1985.

b) GOJ FIP, "Design Criteria for Civil Engineering under the Facilities Improvement Projects," GOJ, August 1983.

c) TM 5-813-1, "Water Supply — Sources and General Considerations," March 1979.

d) TM 5-813-3, "Water Supply — Water Treatment," January 1978.

e) TM 5-813-4, "Water Supply — Water Storage," July 1965.

f) TM 5-813-5, "Water Supply — Water Distribution Systems," August 1965.

g) TM 5-813-6, "Water Supply — Water Supply for Fire Protection," October 1965.

h) TM 9-1300-206, "Ammunition and Explosives Standards," August 1973.

i) U.S. Public Health Service Drinking Water Standards, 1972.

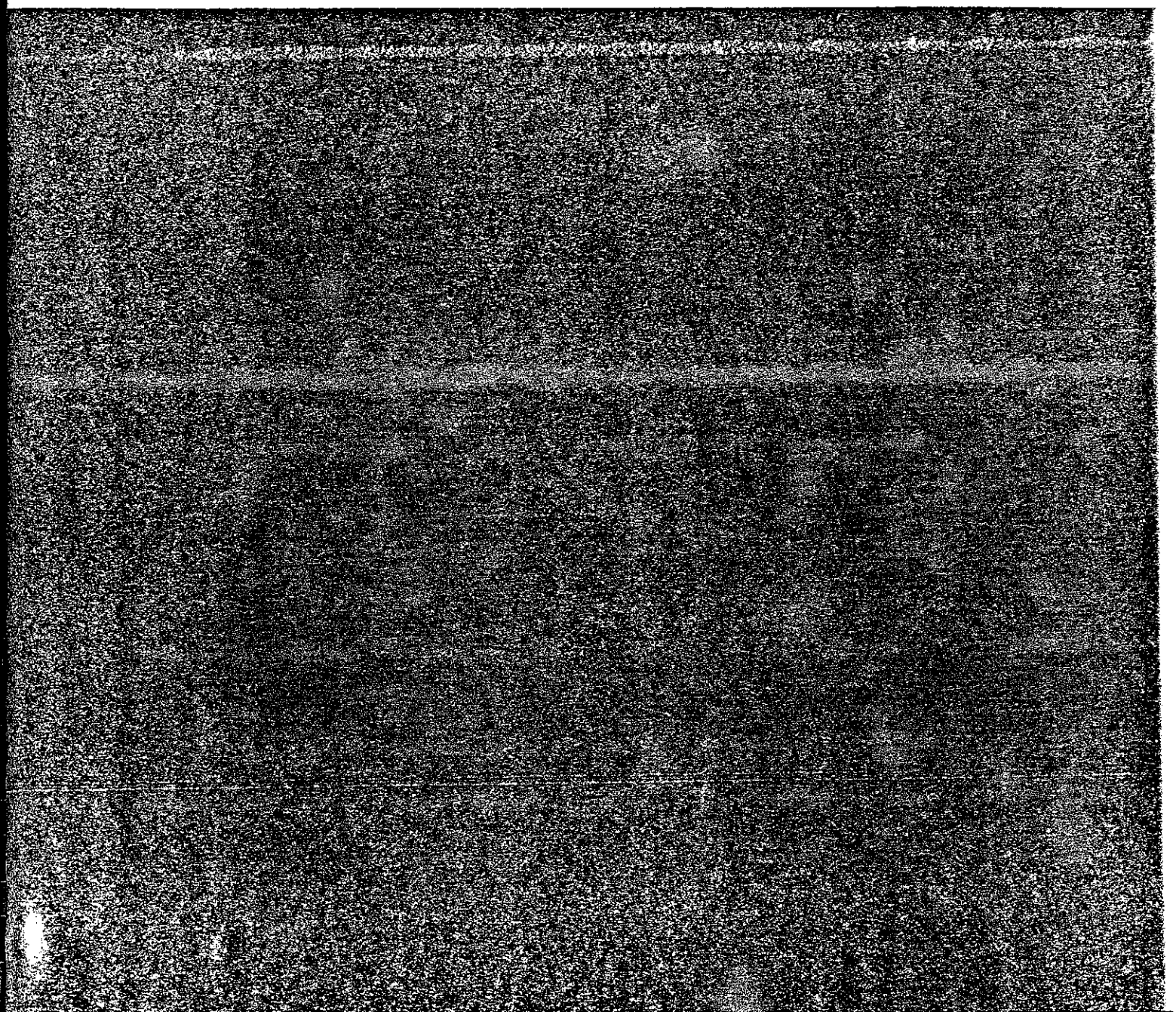
j) U.S. Safe Water Drinking Act, 1974.

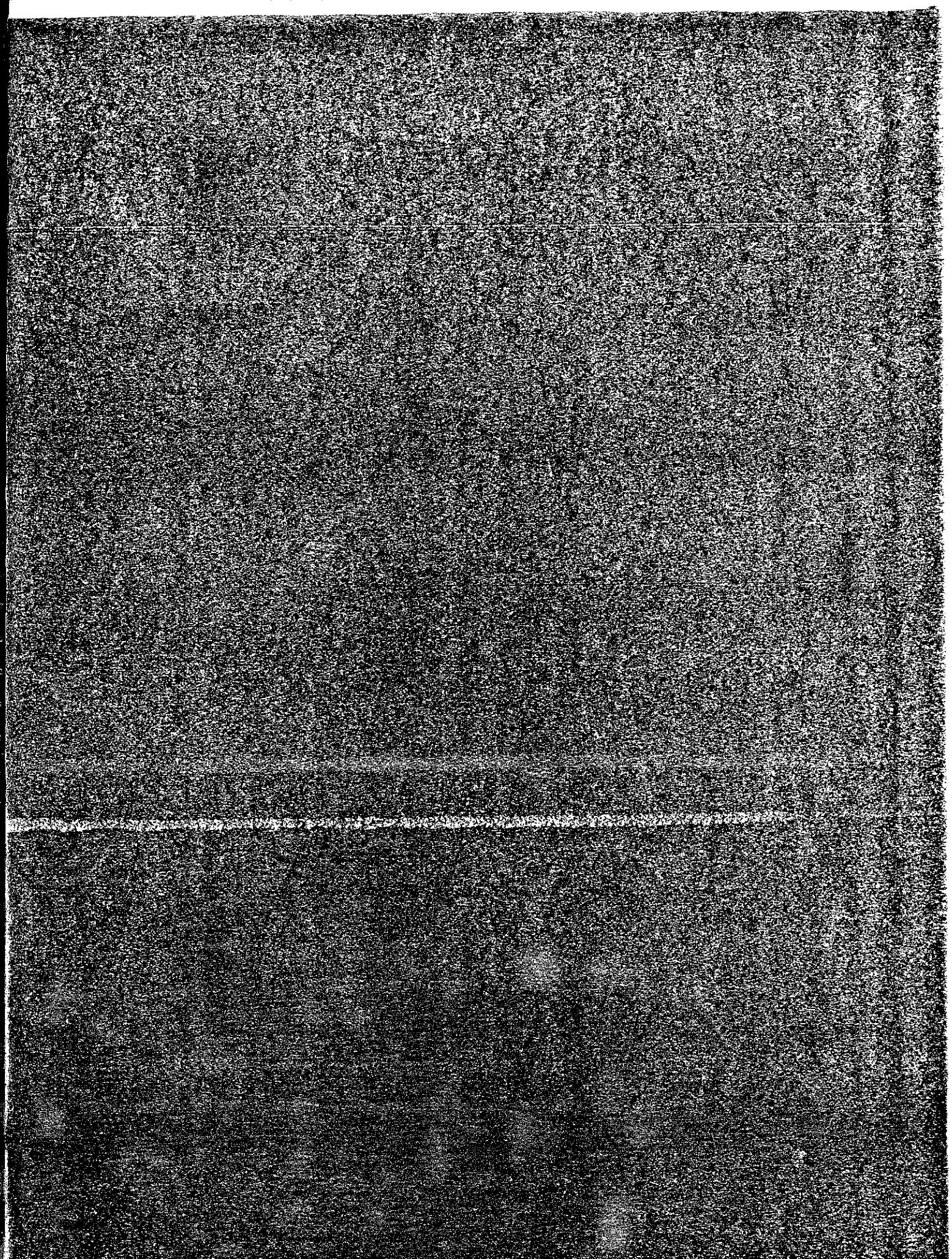
2.2.2 Existing Conditions

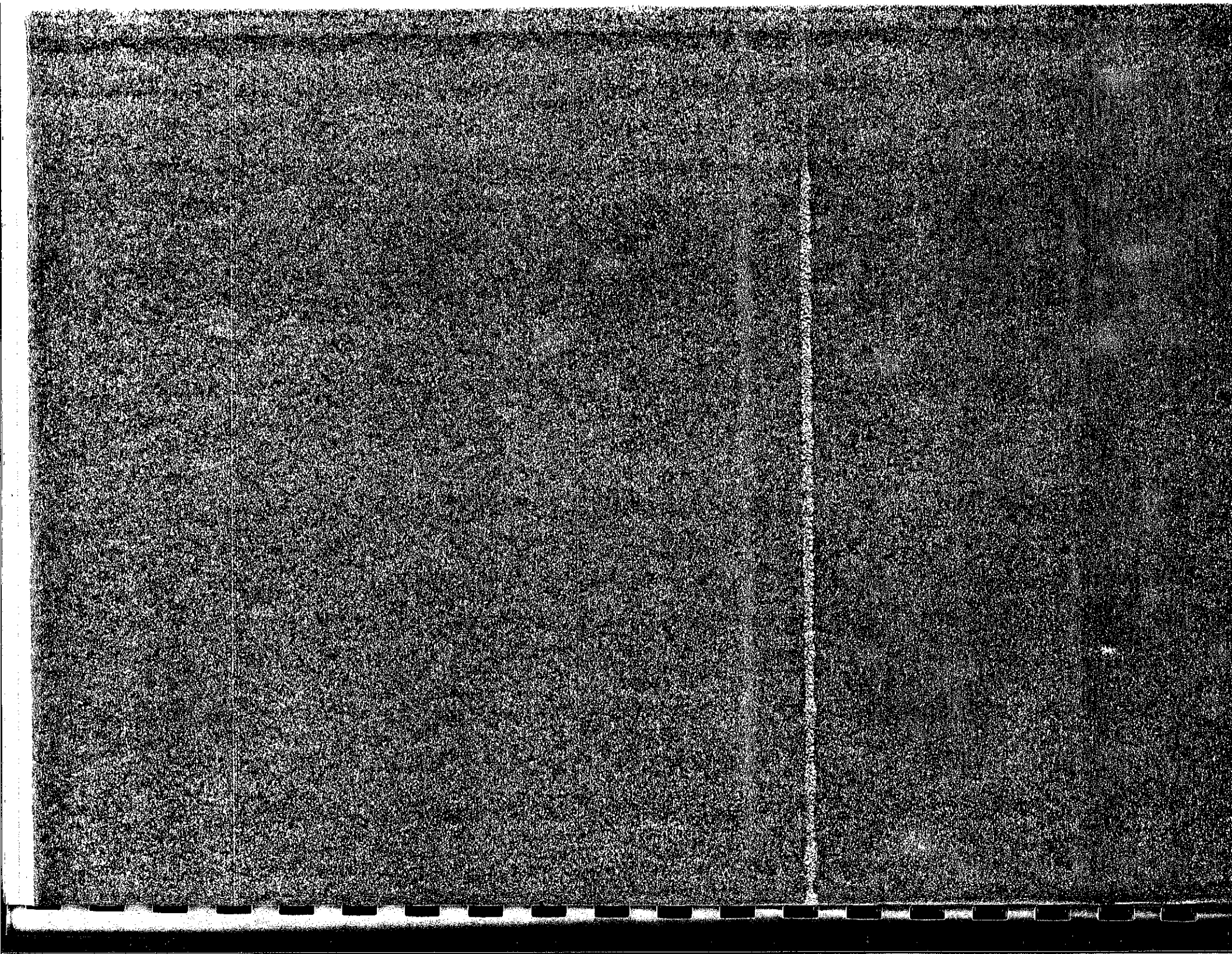
At Kawakami Ammunition Depot, potable and fire protection water supplies have separate sources and distribution systems. The systems will be discussed separately in the following sections.

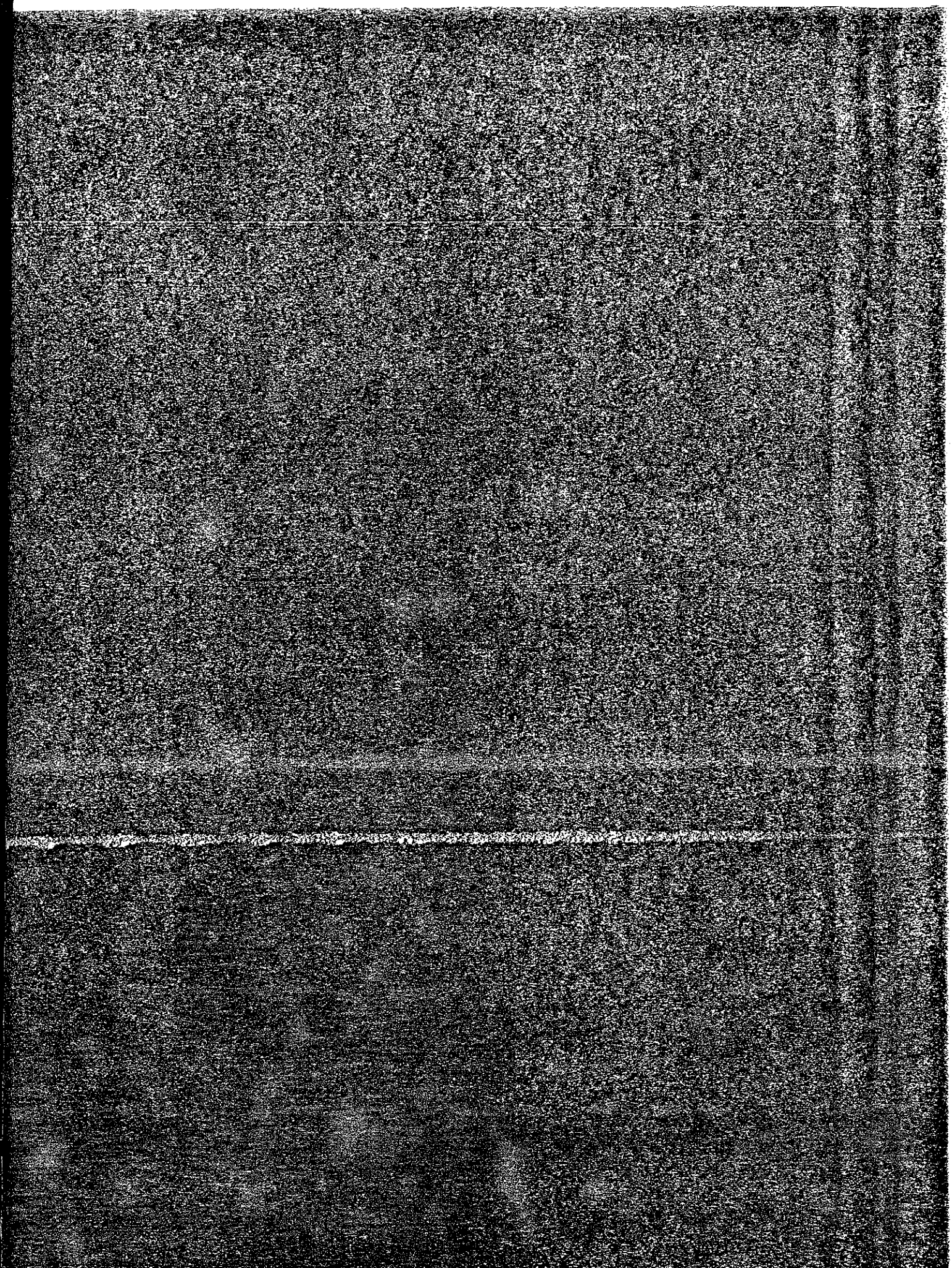
2.2.2.1 Potable Water Supply

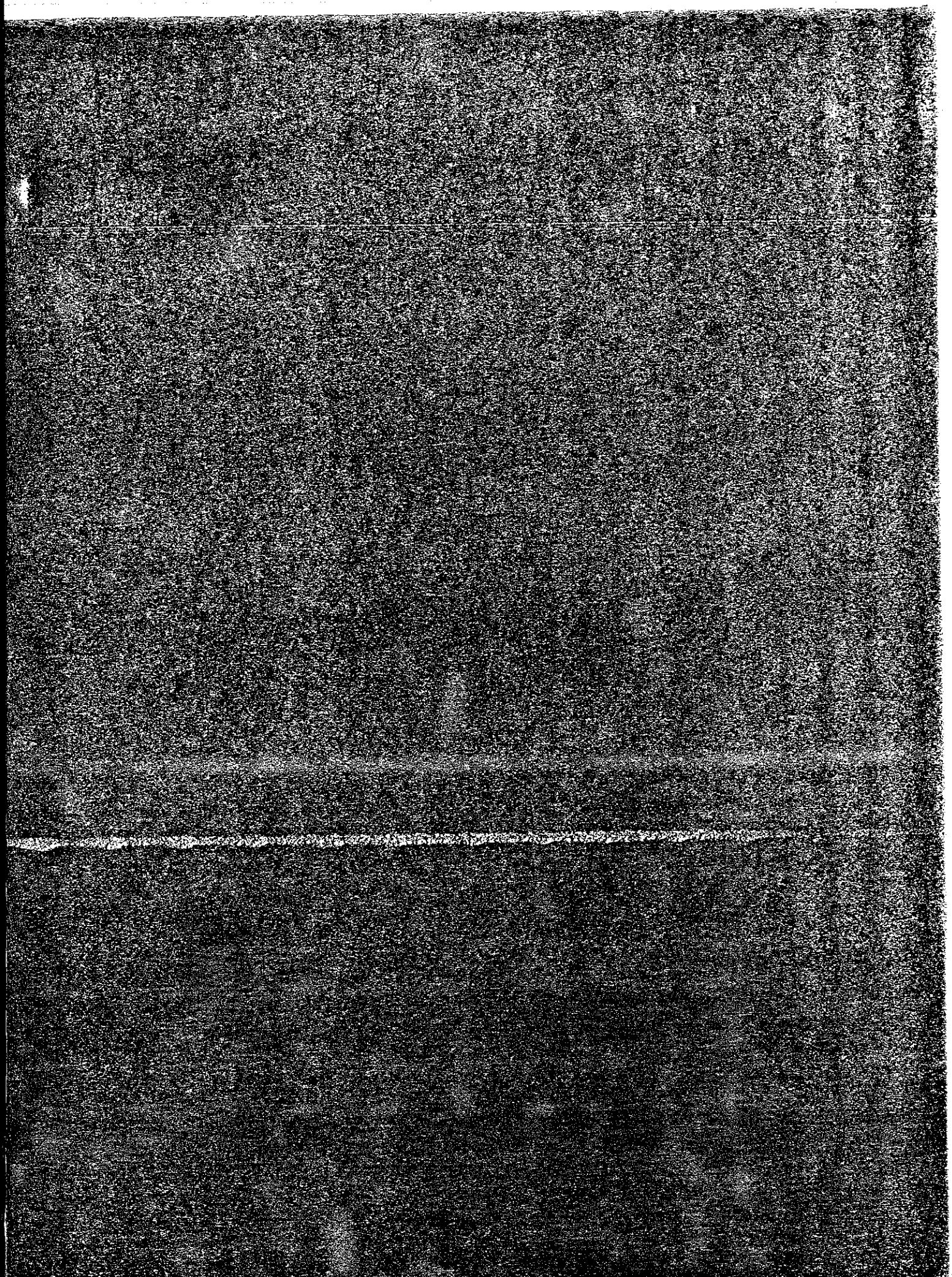
Potable water for Kawakami Ammunition Depot comes from two sources which supply the Administration Area and the Ammunition Renovation Area, respectively.











2.2.4 Design Calculations

2.2.4.1 Potable Water Demand

2.3 GENERAL HEATING STUDY

2.3.1 General

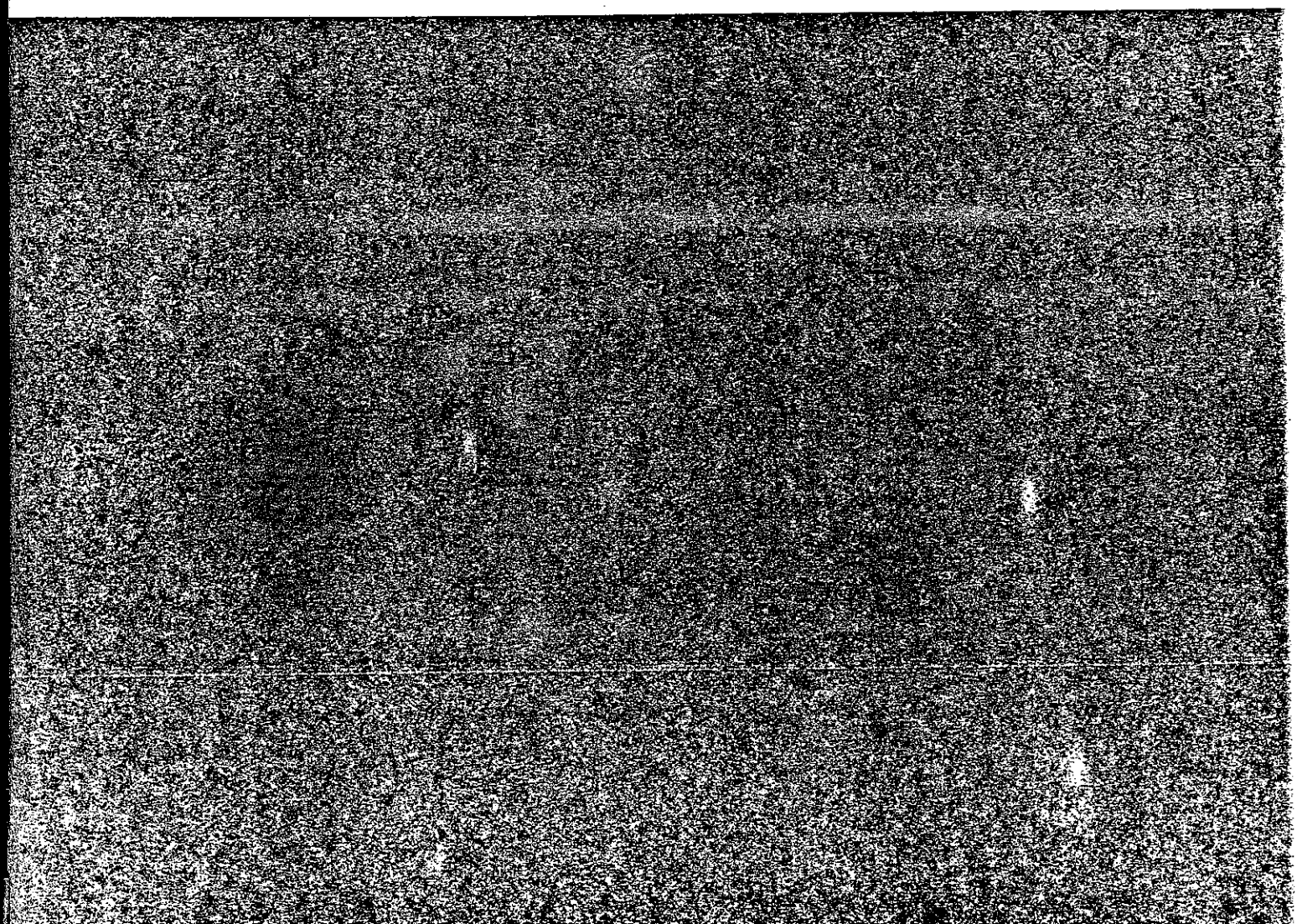
Heating facilities are under the 820 Army construction category code series.

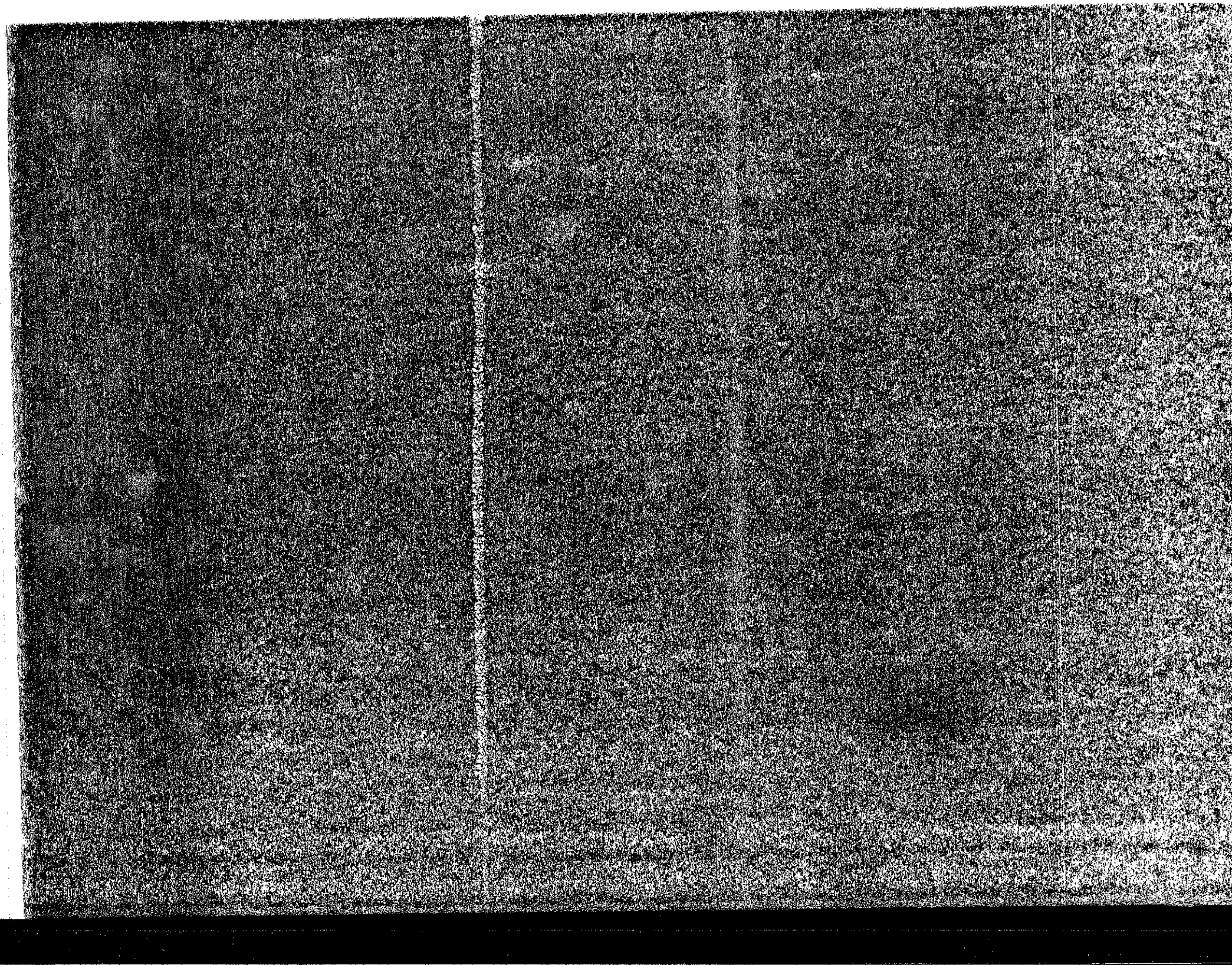
Design of steam, hot water and fuel oil heating systems and domestic hot water systems shall be in accordance with appropriate Army criteria. The following list identifies some of the manuals of concern:

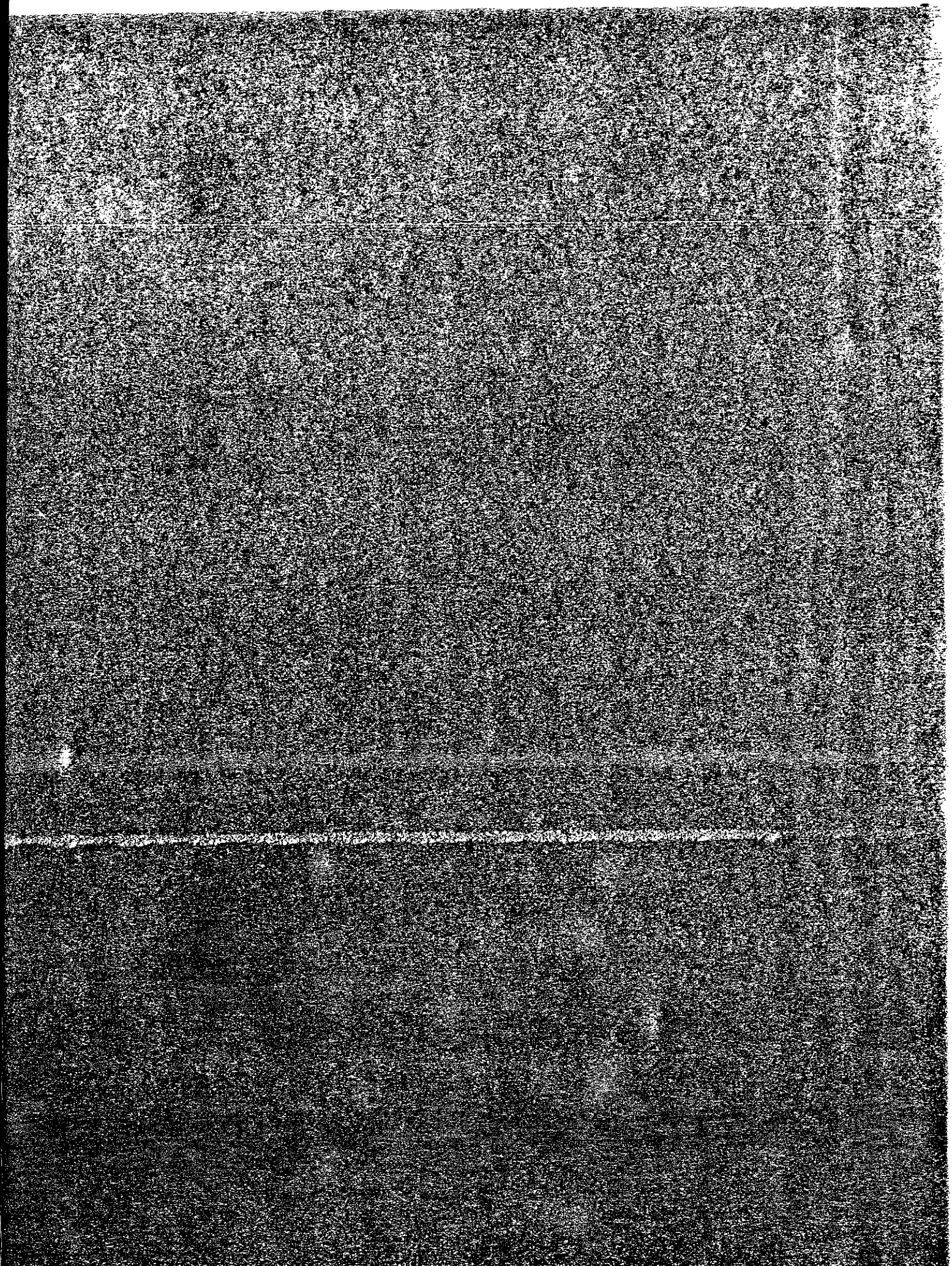
a) TM 5-810-2, "High Temperature Water Heating Systems," March 1977.

b) TM 5-810-6, "Nonindustrial Gas Piping Systems," March 1984.

c) TM 5-650, "Central Boiler Plants," August 1962.







2.4 GENERAL SANITARY SEWER STUDY

2.4.1 General

Sanitary sewer facilities are under the 830 Army Construction category code series.

Design of sanitary sewage systems shall be in accordance with appropriate Army and Government of Japan criteria as applicable. The following list identifies the manuals of concern:

a) TM 5-814-1, "Sanitary Engineering — Sanitary and Industrial Waste Sewers," August 1966.

b) GOJ FIP, "Design Criteria for civil Engineering under the Facilities Improvement Projects," August 1983.

c) TM 5-814-2, "Sanitary Engineering — Sewage and Industrial-Waste Pumping stations," August 1965.

d) TM 5-814-3, "Sanitary Engineering — Domestic Wastewater Treatment," November 1978.

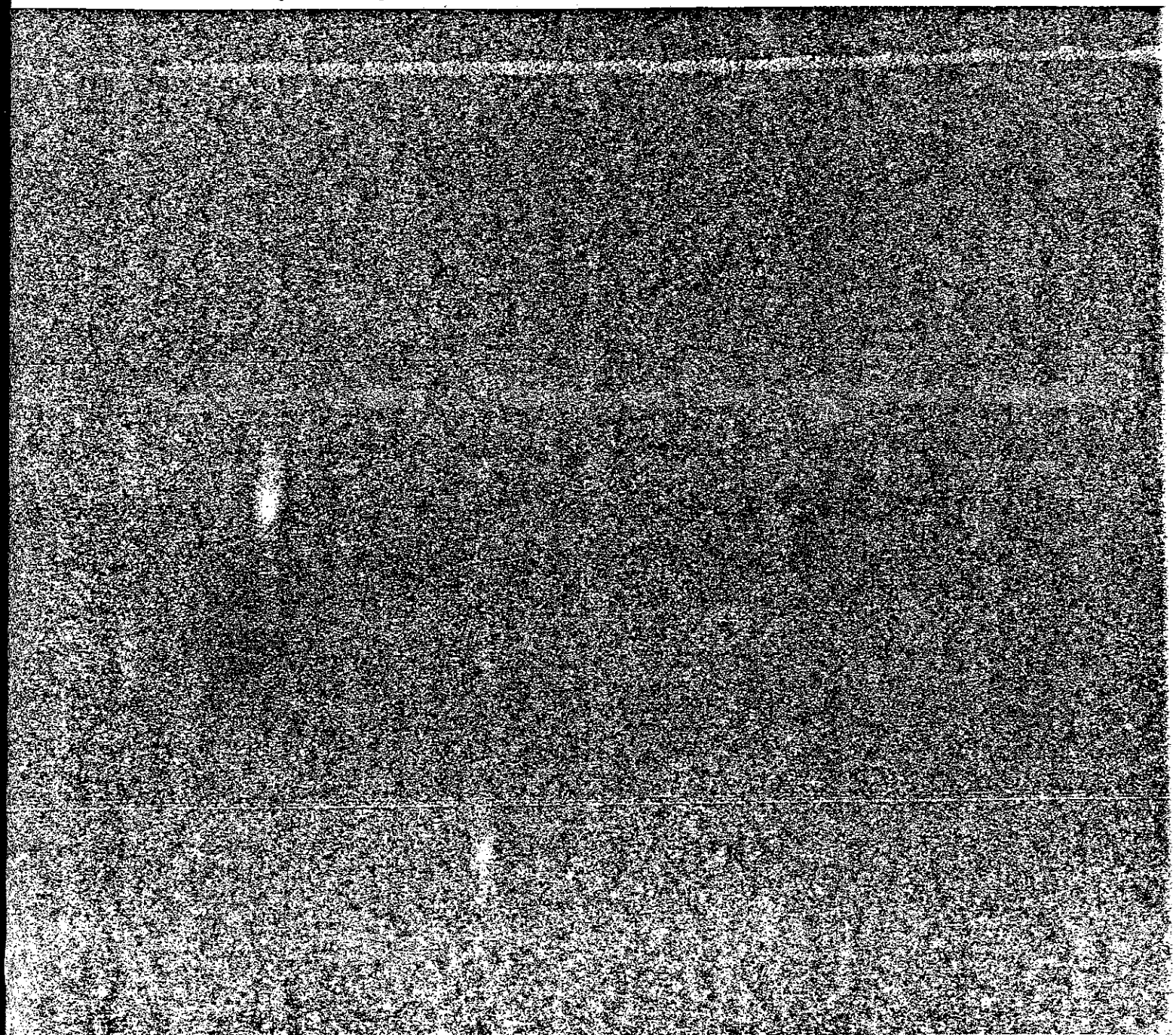
e) AR 200-1, "Environmental Quality — Environmental Protection and Enhancement," July 1982.

f) Appropriate GOJ EPA regulations and local standards.

2.4.2 Existing Conditions

There are 13 septic tanks servicing Kawakami Ammunition Depot. The effluents of these tanks are discharged into nearby storm drainage ditches. Solids in the tanks are periodically collected by a contractor and transported offsite for disposal. Septic tank discharge is monitored semi-annually and is in compliance with local discharge laws.

The septic tanks provide domestic wastewater treatment service to various locations throughout the base making the installation of a central collection and treatment system impractical.



2.5 GENERAL STORM DRAINAGE STUDY

2.5.1 General

Storm drainage facilities are under the 871 Army construction category code series.

Design of storm water drainage systems shall be primarily based on Army Technical Manual No. 5-820-4 and Government of Japan criteria with considerations being given to Army airfield drainage manuals where applicable and to structural design concerns as found in TM 5-814-1. The following list identifies the manuals of concern:

a) TM 5-820-4, "Drainage for Areas Other Than Airfields," October 1983.

b) GOJ FIP, "Design Criteria for Civil Engineering under the Facilities Improvement Projects," August 1983.

c) TM 5-820-1, "Surface Drainage Facilities for Airfields and Heliports," April 1977.

d) TM 5-820-2, "Drainage and Erosion Control -- Subsurface Drainage Facilities for Airfield Pavements," March 1979.

e) TM 5-820-3, "Drainage and Erosion Control -- Structures for Airfields and Heliports," January 1978.

f) TM 5-814-1, "Sanitary Engineering -- Sanitary and Industrial Waste Sewers," August 1966.

2.5.2 Existing Conditions

At Kawakami Ammunition Depot, storm runoff flows over land areas of varying slopes and conditions until concentrating in ditches, channels or natural streams. Normally, the flow of water in the smaller tributary streams and the main channel within the Depot is low. During heavy rains, though, overflow has been experienced with minor damage to some existing facilities resulting.

Clogging of drainage channels due to accumulations of eroded soils, plant life and debris has contributed to overflowing within the sytem. Recent dredging, clearing and reshaping of stream beds has lessened the problem; however, it continues to be an ongoing phenomenon requiring periodic corrective action.

Diversion ditches are used around the many embankments and sloped areas at the Depot, many of which are in a state of disrepair.

2.5.3 Future Developments

2.5.3.1 Improve Storm Drainage System

Improvements to the storm drainage system are to be implemented in a four phase project. The new work is to include the installation and/or replacement of open ditches and diversion channels around ammo storage embankments, improvements to existing main stream lines, and installation of new ditches along road networks.

2.5.3.2 Realign Utility Right-of-Way

As a part of the Realign Utility Right-of-Way project, 1,800 linear feet of main storm drainage channel are to be realigned. This will include the installation of 21,600 square feet of block side wall and 18,000 square feet of rip-rap channel bottom and construction of drop structures as necessary to control drainage velocity.

The project will also include construction of new discharge outlets for three tributaries along the realigned channel and reconstruction of 900 linear feet of the existing main channel.

2.5.4 Design Considerations

(Reference: Criteria Package for Upgrade Utilities, December 1987)

Statistical Design Storm:	100 year 1 hour storm, 3.75 inches per hour
Runoff Coefficient:	0.4
Infiltration Rate:	0.4 inches per hour

2.6 GENERAL ELECTRICAL STUDY

2.6.1 General

Electrical facilities are under the 810 Army construction category code series.

Design of electrical systems shall be in accordance with appropriate Army criteria. The following list identifies some of the manuals of concern:

a) TM 5-811-1, "Electric Power Supply and Distribution," September 1984.

b) TM 5-811-6, "Electric Power Plant Design," January 1984.

c) TM 5-765, "Electric Power Transmission and Distribution," June 1970.

d) TM 9-1300-206, "Ammunition and Explosives Standards," August 1973.

2.7 GENERAL TELEPHONE STUDY

2.7.1 General

Communication facilities are under the 130 Army construction category code series.

Design of communication facilities shall be in accordance with appropriate Government of Japan and U.S. Army criteria as applicable.