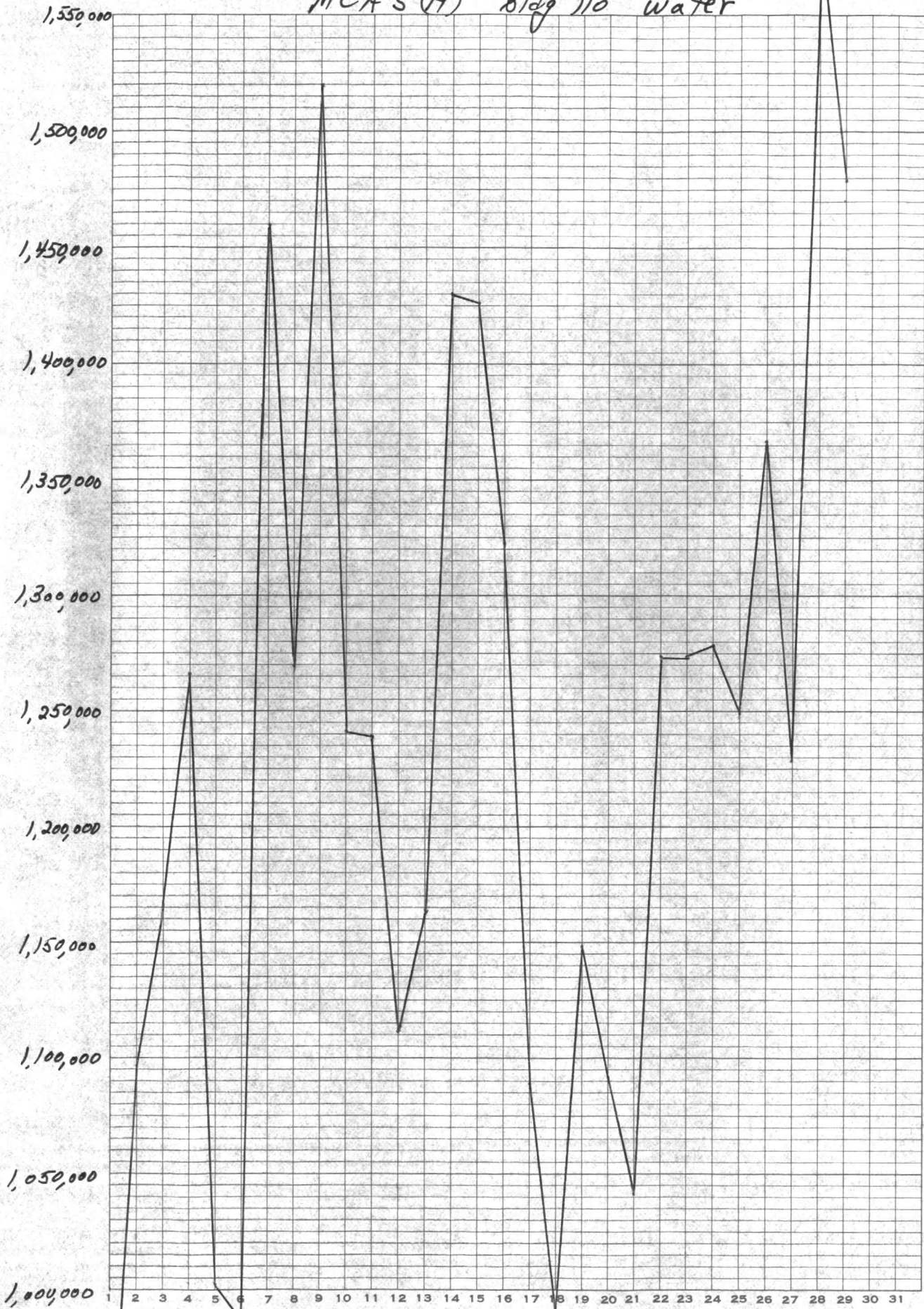


MCA S (H) Bldg 110 water



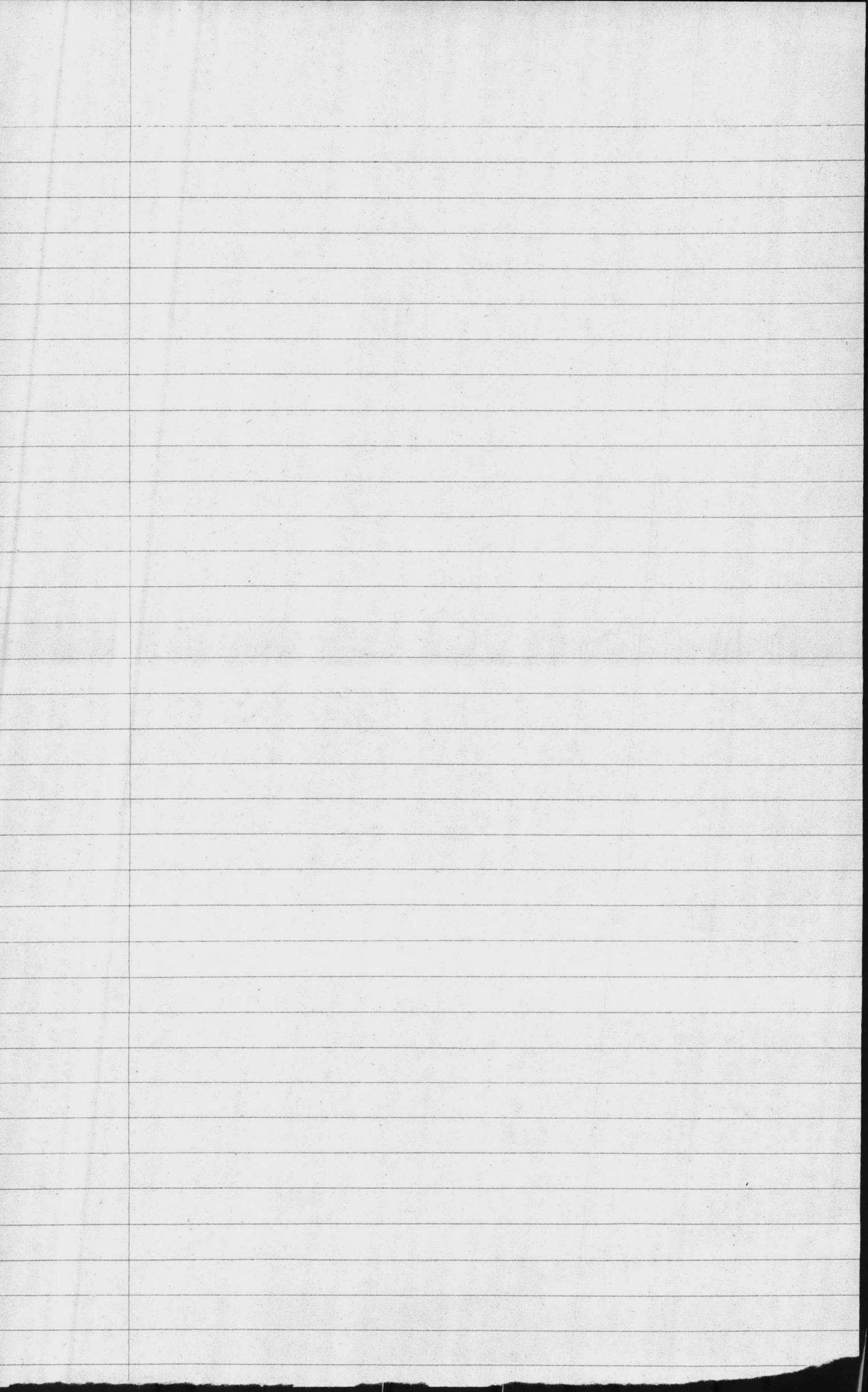
DIETZGEN CORPORATION
MADE IN U.S.A.

NO. 340-T6 DIETZGEN GRAPH PAPER
ONE MONTH BY DAYS

MONTH January 1979

Jan 79 McAS(N) Bldg 110 Water

1	900,000	←
2	1,097,000	
3	1,167,000	
4	1,266,000	
5	1,003,000	
6	969,000	
7	1,460,000	
8	1,269,000	
9	1,570,000	
10	1,241,000	
11	1,239,000	
12	1,111,000	
13	1,163,000	
14	1,430,000	
15	1,426,000	
16	1,322,000	
17	1,088,000	
18	983,000	
19	1,148,000	
20	1,092,000	
21	1,042,000	
22	1,273,000	
23	1,273,000	
24	1,278,000	
25	1,249,000	
26	1,367,300	
27	1,228,000	
28	1,590,100	←
29	1,478,800	
30	408,657	
31		



WATER ANALYSIS

THE PERMUTIT COMPANY, 330 West 42nd Street, New York 36, N.Y.

Sheet 1.

NAME USMC Air Facility DATE 5-12-55 LAB. NO. P-235840
Peter Field Point
 ADDRESS Camp Lejeune, North Carolina DATE SAMPLE COLLECTED 4-29-55 DATE ANALYZED 5-6-55

COPIES SENT TO Greensboro, N. C. SENT IN BY R. Poore

- A. Raw private supply from Artesian well. Sample taken from Softener Inlet. Clear when drawn. No H₂S odor.
- B. Raw and Filtered, private supply from Artesian well. Sample taken from Filter Effluent. Clear when drawn. No H₂S odor. (Aerated before filtering).
- C. Softened, private supply from Artesian well. Sample taken from Effluent. Clear when drawn. No H₂S odor.

** 2, 3, 4 wells*

		PPM as	A.	B.	C.
CATIONS	Calcium..... (Ca ⁺⁺)	CaCO ₃	110	116	
	Magnesium..... (Mg ⁺⁺)	CaCO ₃	18	18	
	Sodium..... (Na ⁺)	CaCO ₃	320	320	345
ANIONS	Bicarbonate HCO ₃ ⁻	CaCO ₃	328	324	320
	Carbonate Alkalinity (CO ₃ ⁻⁻)	CaCO ₃	0	0	0
	Hydroxide (OH ⁻)	CaCO ₃	0	0	0
	Chloride..... (Cl ⁻)	CaCO ₃	120	122	117
	Sulfate..... (SO ₄ ⁻⁻)	CaCO ₃	9	11	11
		CaCO ₃			
✓ Total Hardness.....	CaCO ₃	128	128	0	
✓ Alkalinity A (Methyl Orange).....	CaCO ₃	328	324	320	
✓ Alkalinity B (Phenolphthalein).....	CaCO ₃	0	0	0	
Free Carbon Dioxide.....	CO ₂	11	11	8	
Iron (total).....	Fe	1.3	0.3	0.15	
Silica.....	SiO ₂				
✓ Turbidity (after shaking).....		5	*1.0	3	
Color.....		35	13	18	
✓ pH.....					
Manganese Odor	Mn	0.0	0.0	0.0	
		0	0	0	
Actual Hardness (as CaCO ₃)	Results in grains per U.S. Gal.	7-1/2	7-1/2		
Compensated* Hardness (as CaCO ₃)		8	8		

(*) Compensated Hardness includes addition for Sodium Salts, and is used for calculating ion exchanger capacities. ** By Hellige Id* 17.1 parts per million = 1 grain per U. S. Gall. 38A-34

WATER ANALYSIS

THE PERMUTIT COMPANY, 330 West 42nd Street, New York 36, N.Y.

NAME: _____ LAB. NO.: _____ DATE: _____
 ADDRESS: _____ DATE SAMPLE COLLECTED: _____
 COPIES SENT TO: _____ SENT IN BY: _____

CALCIUM	Calcium (Ca++)	CaCO ₃			
	Magnesium (Mg++)	CaCO ₃			
	Sodium (Na+)	CaCO ₃			
SODIUM	Bicarbonate (HCO ₃ -)	CaCO ₃			
	Carbonate (CO ₃ -)	CaCO ₃			
	Hydroxide (OH-)	CaCO ₃			
	Chloride (Cl-)	CaCO ₃			
	Sulfate (SO ₄ -)	CaCO ₃			
	Total Hardness	CaCO ₃			
	Alkalinity A (Methyl Orange)	CaCO ₃			
	Alkalinity B (Phenolphthalein)	CaCO ₃			
	Free Carbon Dioxide	CO ₂			
	Iron (total)	Fe			
	Silica	SiO ₂			
	Turbidity (after settling)				
	Color				
	pH				
	Total Hardness (as CaCO ₃)	mg/l			
	Non-carbonate Hardness (as CaCO ₃)	mg/l			

(*) Comparison of hardness includes addition for sodium salts and is used for calculation on evaporator capacity.
 100 parts per million = 1 grain per gallon.

NOTICE:
Bids to be opened at 1:00 P.M.
EST 1 June 1954 at the Public
Works Office, Marine Corps Base,
Camp Lejeune, N. C.

NAVDOCKS
SPECIFICATION
NO. 41919

EXPANSION OF WATER TREATMENT FACILITIES,

CAMP GEIGER

at the

Marine Corps Base, Camp Lejeune, N. C.

Contract NOy-83255

Appropriation: 1741106.11 MCT&F 1954

A priority rating, in consonance with the rating system in effect at the time of award of this contract, will be issued by the Bureau of Yards and Docks.

CONTENTS

SECTION	SECTION
1. General clauses	8. Water piping
2. Earthwork	9. Mechanical equipment
3. General construction	10. Sewage disposal system
4. Plumbing	11. Paving, drainage and fencing
5. Interior electrical	12. Basis of bids
6. Exterior electrical	13. Bids
7. Brine piping system	

SECTION 1. GENERAL CLAUSES

1-01. General intention. - It is the declared and acknowledged intention and meaning to provide and secure water treatment facilities at Camp Geiger, complete and ready for use.

1-02. General description. - The work includes the construction of a 600,000 gallon reinforced concrete reservoir; the construction of brine storage tanks and pumphouse; the alteration of the existing water softening plant and includes the provision of chlorinating equipment, recording altitude gauge, brine pumps and piping, water piping, fencing, electrical, plumbing, sewage disposal system, grading and drainage work.

1-03. Location. - The work shall be located at the Marine Corps Base, Camp Lejeune, North Carolina, approximately as shown. The exact location will be indicated by the Officer in Charge.

1-04. Form of contract. - The contract will be executed on U. S. standard form no. 23 revised March 1953 and will include U. S. standard form no. 23A, March 1953, General Provisions, and NavDocks form no. 113, November 1953, Additional General Provisions. The following provisions are added to the Alterations Clause in standard form 23, Construction contract:

"a. Navdocks form no. 113, Additional General Provisions, is hereby made a part of this contract with the following corrections:

(1) The phrase 'including connection charges' is inserted after the word 'utilities' in the fifth sentence of Clause 43, Government Utilities.

(2) The word 'not' is inserted between the word 'shall' and the word 'be' in line eleven, paragraph (b), Clause 52, Government Furnished Property.

b. Clause 53 -- Renegotiation -- is hereby deleted and the following substituted in lieu thereof:

RENEGOTIATION

(a) This contract shall be subject to any act of the Congress, whether heretofore or hereafter enacted and to the extent indicated therein, providing for the renegotiation of said contract and shall be deemed to contain all the provisions required by any such act without subsequent amendment of this contract specifically incorporating such provisions.

(b) The Contractor (which term, as used in this clause, means the party contracting to furnish the materials or perform the work required by this contract) agrees to insert the provisions of this clause, including this paragraph (b), in subcontracts, as defined in Section 103(g) of the Renegotiation Act of 1951 (P.L. 9, 82nd Cong.), except any subcontracts of a class or type described in Section 106(a) of the Renegotiation Act of 1951.

(c) Nothing contained in this clause shall impose any renegotiation obligation with respect to this contract or any subcontract hereunder which is not imposed by an act of the Congress, heretofore or hereafter enacted."

1-05. Performance and payment bonds, executed on U. S. standard form nos. 25 and 25-A, respectively, will be required as stipulated in U. S. standard form no. 20 revised March 1953, Invitation for Bids.

1-06. Time for completion. - The entire work shall be completed within 120 calendar days after date of receipt of a notice of award or any other communication authorizing the contractor to proceed.

1-07. Damages for delay in accordance with Clause 5 of U. S. standard form no. 23A shall be at the rate of \$60.00 per calendar day. The Government will take no action pursuant to Clause 5, Liquidated Damages, to terminate the right of the contractor to proceed or to assess liquidated or actual damages where the failure of the contractor to complete the work within the time specified elsewhere in this contract is due solely to the operation of the priorities and allocations system and is not otherwise caused by the fault or negligence of the contractor. It is understood and agreed that such delays will be considered an act caused by the Government and as such will be excusable within the meaning of Clause 5, and the contractor will be entitled to a time extension by reason thereof.

1-08. Drawings accompanying specification. - The following drawings accompany this specification and are a part thereof. The drawings are the property of the Government and shall not be used for any purpose other than that contemplated by the specification.

<u>Y&D Drawing No.</u>	<u>Title</u>
645299	Index
645300	Site Plans

SPECIFICATION NO. 41919

<u>Y&D Drawing No.</u>	<u>Title</u>
645301	600,000 gallon Reservoir, Structural Plan and Details
645302	Salt Storage Tanks, Structural and Mechanical Plans and Details
645303	Alterations to Softening Plant, Plans, Elevations and Details
645304	Electrical Plans and Details
645305	Miscellaneous Piping Details
645306	Yard Piping and Sewage Disposal System, Plans and Details
645307	Drainage Outfall System, Plan and Profile.

1-09. Standard specifications. - The standard specifications given in the following list or mentioned elsewhere herein (including the addenda, amendments, and errata listed) shall govern in all cases where references to standard specifications are made. In case of difference between these standard specifications and this specification or its accompanying drawings, this specification or its accompanying drawings shall govern. Especial care shall be exercised to refer in request for quotations, in orders, and in subcontracts to the standard specifications and to all modifications thereof. The requirements for packaging, packing, marking, and preparation for shipment or delivery included in the standard specifications shall apply only to materials and equipment which are furnished directly to the Government and not to materials and equipment which are to be installed by the contractor.

BUREAU OF YARDS AND DOCKS

7Yg	Jan.	1934	Roofing, siding, and sheet metal work; dampproofing and membrane waterproofing; including addendum No. 1.
9Yf	Oct.	1946	Electrical apparatus, distributing systems, and wiring, including addendum No. 1.
13Yd	June	1951	Concrete construction, including addendum No. 1.
21Yc	June	1940	Installation of power-plant, heating, and ventilating apparatus and piping.
28Yc	Oct.	1944	Carpentry and joinery.
31Yc	Sept.	1947	Interior plumbing systems.
36Ya	Nov.	1951	Low-pressure forced-circulation hot water heating systems.
42Ya	May	1947	Manholes and frames and covers.

DEPARTMENT OF THE NAVY

47S29c	June	1945	Steel, sheet, zinc-coated (galvanized).
66Pla(INT)	Sept.	1941	Power plant, heating, and ventilating apparatus and piping (shore use).

MILITARY

MIL-F-1184	Sept.	1949	Fittings, pipe, brass or bronze (threaded) 125-pound.
MIL-P-2780	Sept.	1941	Pipe, brass, seamless, iron-pipe size, standard and extra strong.
MIL-U-16365	Sept.	1951	Unions, iron (malleable) or steel 250 psi saturated steam 500 psi cold water; including amendment 1.
MIL-C-17226	May	1952	Chlorinator, gas type, with accessories.

FEDERAL

DD-G-451a	June	1951	Glass; flat and corrugated for glazing, mirrors and other use; including amendment 1.
FF-H-106a	Nov.	1948	Hardware, builders'; locks and door-trim; including amendment No. 1.
FF-H-111a	July	1948	Hardware, builders'; shelf and miscellaneous.
FF-H-116b	Nov.	1940	Hardware, builders'; hinges (non-template); including amendment No. 2.
FF-P-101b	July	1952	Padlocks, including amendment no. 1.
QQ-L-156	Nov.	1946	Lead; caulking, including amendment No. 1.
RR-F-183	Aug.	1946	Fence Posts, gates, and accessories; including amendment No. 1.
RR-F-191	Apr.	1937	Fencing; chain-link or welded; including amendment No. 1.
RR-F-221b	Mar.	1953	Fencing, wire (barbed, woven-wire, and wire-netting).
SS-C-181b	Apr.	1939	Cement, masonry, including amendment No. 1.
SS-C-621	May	1935	Concrete-units; masonry, hollow, including amendment No. 1.
SS-P-361a	Jan.	1953	Pipe; clay, sewer, including Amendment No. 1.
TT-E-506b	June	1949	Enamel; interior, gloss, tints and white; including Amendment No. 1 and Notice No. 1.
TT-P-21	Aug.	1952	Paint; cement water, powder, white and tints (for interior and exterior use); including Amendment No. 2.

SPECIFICATION NO. 41919

TT-P-51b	Mar.	1948	Paint, oil, interior, flat wall, tints and white.
TT-P-86a	Apr.	1951	Paint; red-lead-base, ready-mixed; including Amendment No. 1.
TT-P-104	Apr.	1951	Paint (white lead and oil, exterior, ready-mixed, white and light tints); including Amendment No. 1.
TT-P-641	Apr.	1939	Primer, paint; zinc, dust-zinc oxide (for galvanized (zinc-coated) or zinc surfaces); including Amendment No. 2.
TT-P-781a	July	1943	Putty and elastic-compound, (for) metal-sash-glazing; including Amendment No. 1.
TT-P-791a	July	1943	Putty, pure-linseed-oil, (for) wood sash glazing; including Amendment No. 1.
WW-P-401	July	1951	Pipe and pipe-fittings; soil cast iron; including Amendment No. 3.
WW-P-406	June	1945	Pipe; steel and ferrous alloy (for) ordinary uses (iron-pipe size); including Amendment No. 1.
WW-P-421	Apr.	1940	Pipe; water, cast-iron (bell and spigot; and bolted-joint); including Amendment No. 3.
WW-P-441b	Dec.	1953	Pipe; wrought iron (welded, black or zinc-coated), including Amendment No. 1.
WW-P-501b	Sept.	1945	Pipe-fittings, cast-iron (screwed) 125- and 250-pound.
WW-P-521b	Sept.	1945	Pipe-fittings, malleable-iron (screwed) 150-pound.
WW-P-541a	Dec.	1947	Plumbing fixtures; (for) land use; including Amendment No. 1.
WW-V-54	Apr.	1946	Valves, bronze, gate, 125- and 150-pound, screwed and flanged (for land use), including amendment No. 1.
LLL-F-311	May	1952	Fiberboard; hard-pressed, structural, including amendment No. 1.

NON-GOVERNMENT

Note. - Non-government standards are not available for distribution by the Department of the Navy; application therefor should be made to the issuing organization.

American Water Works Association.
 American Association of State Highway Officials.

Specification No. M41-49
 Specification No. M86-49
 Method T-89
 Method T-91

NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION

1-10. "General specification for inspection of material" (issued by the Navy Department) with such appendices thereto as may be applicable, of the issues in effect on the date of the invitation for bids, shall govern for the factory inspection of materials and equipment required under the contract, including materials and equipment specified in detail herein or covered by standard specifications. (See also clause 9 of U. S. standard form no. 23A). Factory inspection of other material and equipment for which tests at the place of manufacture are required may be waived at the option of the Government, provided notarized copies of factory test reports are furnished which show compliance with the specification requirements. Factory inspection will not be required for lumber provided it is grade-marked and trade-marked by the association under whose rules it is graded, or provided it is accompanied by certificates of inspection issued by the association under whose rules it is graded or by another inspection agency which is satisfactory to the officer in charge.

1-11. Optional requirements. - Where a choice of materials and/or methods is permitted herein, the contractor will be given the right to exercise the option unless stated specifically otherwise.

1-12. Definitions. - Where "as shown", "as indicated", "as detailed", or words of similar import are used, it shall be understood that reference to the drawings accompanying this specification is made unless stated otherwise. Where "as directed", "as required", "as permitted", "approved", "acceptance", or words of similar import are used, it shall be understood that the direction, requirement, permission, approval or acceptance of the officer in charge is intended unless stated otherwise. As used herein, "provide" shall be understood to mean "provide complete in place", that is "furnish and install".

1-13. Samples. - The contractor shall submit for approval samples of such materials and equipment as may be required whether mentioned specially herein or not.

1-14. Drawings required of the contractor. - Before commencing the installation of any of this work, the contractor shall submit for approval and in accordance with clause 29(f) of Navlocks form no. 113 such drawings as may be required, including those showing:

SPECIFICATION NO. 41919

(a) Manufacturer's descriptive, technical data, and characteristic curves on the brine pumps.

(b) The manufacturer's specifications and illustrations for chlorinating equipment, beam scales, water level transmitter and recording receiver, exhaust fan, and electrical heater.

(c) Shop drawings of reinforcing steel.

1-15. Rates of wages at the site (see clause 20 of U. S. standard form no. 23A). The contractor shall pay mechanics and laborers employed or working directly upon the site of the work wage rates not less than those contained in the wage determination decision of the Secretary of Labor No. N-10,969 which is attached hereto. Any class of laborers and mechanics not listed in the Secretary's decision, which will be employed on the contract, shall be classified or reclassified by the contractor or subcontractor conformably to the Secretary's decision subject to the approval of the contracting officer. In the event the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers and mechanics to be used, the question shall be submitted through the contracting officer to the Secretary of Labor for final determination. Where differing rates are listed for the same trades according to the type of construction on which employed, their application shall be conformable to prevailing area practice, subject to the approval of the officer in charge.

(a) Required by Davis-Bacon Act. - The wage determination decision of the Secretary of Labor attached hereto is made a part of this contract solely for the purpose of setting forth the minimum hourly wage rates required to be paid by the Davis-Bacon Act and is not to be considered as a guaranty, warranty, or representation as to the wage determination decision, the wage rates therein, or the availability of labor at the wage rates indicated. Bidders are advised to make their own investigations, and to rely solely upon their own information, as to local labor conditions, such as wage rates necessary to attract labor, the length of the work day and work week, overtime compensation, health and welfare contributions, available labor supply and prospective changes or adjustments of wage rates in the area concerned which might affect operations under the contract. Under no circumstances shall any mistake in attaching the wage determination decision of the Secretary of Labor or in the determination or statement of the wage rates set forth therein, or the payment of higher wage compensation than set forth therein entitle the bidder to the cancellation of his bid or contract, to an increase in the contract price, or to other additional payment or recovery.

(b) Government right to change. - The Government reserves the right to change the wage determination decision attached to the specification or addendum, either before or after the award of this contract, in accordance with the latest wage determination decision applicable at the time of award of this contract under the regulations of the Secretary of Labor. Such change shall be made without liability upon the Government for any increase in the contract price or other additional payment or recovery.

(c) Apprentices employed pursuant to this determination of wage rates must be registered in a bona fide apprenticeship program registered with a State apprenticeship council recognized by the Federal Committee on Apprenticeship, U. S. Department of Labor; or if no such recognized council exists in a State, it shall mean a program registered with the Bureau of Apprenticeship, U. S. Department of Labor.

1-16. Work outside regular hours. - If the contractor desires to carry on work outside the regular hours or on Sundays or holidays, he may submit application to the officer in charge but shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night he shall light the different parts of the work in an approved manner.

1-17. Security requirements. - No employee or representative of the contractor will be admitted to the site of the work unless he furnishes satisfactory proof that he is a citizen of the United States or if an alien, his residence within the United States is legal.

1-18. Approval of samples, cuts, and drawings. - Matter submitted for approval shall be accompanied by complete information concerning the material, articles, and/or design proposed for use in sufficient detail to show compliance with the specification; and shall be approved before incorporation into the work. Approval thereof will not be construed as relieving the contractor of compliance with the specification, even if such approval is made in writing unless the attention of the officer in charge is called to the non-complying features by letter accompanying the submitted matter. Partial submittals, or submittals of less than the whole of any system made up of inter-dependent components, will not be considered.

1-19. Methods and schedules of procedure. - The work shall be executed in a manner and at such times that will cause the least practicable disturbance to the occupants of the buildings

SPECIFICATION NO. 41919

and the normal activities of the station. Before starting any work, the sequence of operations and the methods of conducting the work shall have been approved.

1-20. Operation of station utilities. - The contractor shall not operate nor disturb the setting of any valve in the station water system. The Government will operate the valves as required for normal conduct of the work. The contractor shall notify the officer in charge, giving reasonable advance notice when such operation is required.

1-21. Examination of premises. - Before submitting proposals, bidders are expected to visit and inspect the site of the work and satisfy themselves as to the physical conditions at the site; the general and local conditions, including availability of labor, the nature and extent of the work; the character and effect of existing adjoining and/or adjacent work; and other factors that can affect the cost of the performance of the contract to the extent that such information is reasonably obtainable.

1-22. Protection and repairs. - The contractor shall comply with the Fire Prevention Requirements, as published by the Officer in Charge of Construction, security rules and regulations of the activity, and shall provide approved means necessary for the protection of all Government and private property, including contents of buildings affected directly or indirectly by his operations. All damage to Government or private property, resulting directly or indirectly from the contractor's actions, shall be made good by him without expense to the Government.

1-23. Existing work damaged or otherwise affected by the contractor's operations shall be restored to a condition as good as existed before the work was commenced, except where indicated or specified otherwise. Where new construction adjoins, connects to, or abuts the existing work, the junction shall be made in a substantial workmanlike and weathertight manner as the case requires. All new work shall match, as nearly as practicable, the existing adjoining and/or adjacent similar work unless indicated otherwise. Except where specifically designated as being retained by the Government or to be reinstalled in the new construction, all materials, fixed equipment and/or debris resulting from demolition and removal operations shall be removed by the contractor from the limits of the Government reservation at such times during the progress of the work as directed.

1-24. Safety requirements. - The contractor shall conduct the construction work in accordance with the applicable requirements of the publication "Safety Requirements" (Revised 1951),

SPECIFICATION NO. 41919

Department of the Army, Office of the Chief of Engineers, United States Army. Where unusual conditions exist, making it difficult or impossible to apply specific provisions of that publication, the contractor shall submit and obtain written approval of an adaptation of those provisions complying with the intent thereof.

1-25. Payrolls and affidavits. - The prime contractor, sub-contractors and sub-sub-contractors will be required to submit a copy of each weekly payroll together with a Notarized Contractor's Weekly Payroll Affidavit covering the payroll to the Officer in Charge of Construction within seven days after the regular payment date of the payroll period. The receipt of these payrolls and affidavits is made a condition precedent to payment for any amounts due under the contract.

(a) The payroll shall be identified by the name of the contractor, NOy Contract Number and the location of the site of the work. Payrolls shall state accurately and completely for each employee, his name, classification, social security number, rate of pay, daily and weekly hours worked, wages earned, all deductions from such wages and the actual weekly wages paid. Contractors are required to submit employees addresses with the payroll on which the employee's name first appears.

(b) Contractor's Weekly Payroll Affidavit (NAVDOCKS Form FC 118) (Rev. 10-51) which must be used shall be reproduced by the contractor for his use. This form combines the required payroll affidavit and certification of payrolls. In order to provide uniformity with regard to information, contractors are advised to list by title or name, all deductions made, omitting from the listing the dollar amount of the deductions.

(c) When apprentices are employed pursuant to the minimum wage determination herein, the following additional certifications must appear on the weekly payrolls:

"This is to certify that all apprentices employed on the contract are bona fide apprentices registered with the _____

Signed _____"

(Insert above the State Apprenticeship Agency recognized by the Federal Committee on Apprenticeship, U. S. Department of Labor or if no recognized agency exists in a State, a program registered with the Bureau of Apprenticeship, U. S. Department of Labor in which the apprentices are registered.)

(d) A sworn affidavit accomplished by the contractor, stating that he and his sub-contractors have complied with the Labor Standards provisions of the contract, must now accompany each request for reimbursement. Affidavit form will be furnished by the Officer in Charge of Construction.

1-26. Schedule of prices. - Upon award of the contract, the contractor shall promptly prepare Y&D Form 83 "Schedule of Prices", in octuplicate and submit to the Officer in Charge of Construction.

1-27. Sub-contractors and personnel. - Promptly after the award of the contract, the contractor shall submit to the Officer in Charge of Construction, in triplicate, a list of his sub-contractors and the work each is to perform together with the sub-contract price.

(a) On this form shall appear the names of the key personnel of the contractor and sub-contractors, together with their home addresses and telephone numbers, for use in event of an emergency.

(b) From time to time as changes occur and additional information becomes available, the contractor shall amplify, correct and change the information contained in previous lists.

1-28. Lines and grades required for execution of the work shall be established by the contractor.

1-29. As-built drawings. - On completion of the work, one print of each of the drawings accompanying this specification shall be neatly and clearly marked in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, and delivered to the officer in charge. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as may be necessary for legibility and clear portrayal of the as-built construction; the marked prints shall be subject to approval before acceptance.

1-30. Disposal of removed material. - Material removed during the operations of this contract and suitable for re-use shall be hauled to a Government warehouse located not more than 12 miles from the site of operations and material recovered and unfit for re-use, shall be hauled to a dump located not more than 3 miles from the site of operations.

SECTION 2. EARTHWORK

2-01. Elevations and obstructions. - Bids shall be based on the following:

- (a) that the surface elevations are as indicated;
- (b) that no pipes or other artificial obstructions, except those indicated, will be encountered; and
- (c) that hard material will not be encountered.

In case the actual conditions differ substantially from those stated and/or shown, the provisions of clause 4 of U. S. standard form no. 23A respecting an adjustment for changed conditions shall apply, subject to the requirement of notification thereunder being given. Hard material shall be defined as solid ledge rock, boulders more than one-half cubic yard in volume, or any cemented material requiring blasting for removal.

2-02. Topsoil. - Material from the excavations suitable for topsoil shall be deposited in piles separate from other excavated material. Piles of topsoil shall be located so that the material can be used readily for the finished grading and shall be protected and maintained until needed. If sufficient topsoil cannot be secured from the project site, it shall be secured from barrow pits less than four miles distant from the project site. Where used for finished grading of the surfaces to be planted to grass, topsoil shall be spread uniformly over the designated areas.

2-03. Clearing and grubbing. - No general clearing and grubbing is anticipated. However, all vegetable and other objectionable materials shall be removed to a depth of six (6) inches below trench bottoms, and where stumps are encountered in excavation for building footings they shall be removed, regardless of depth. All stumps, debris and spoil shall be hauled to a disposal area to be designated at a distance not to exceed two miles.

2-04. Excavation. - All materials shall be excavated to the dimensions and levels indicated on the drawings, or in the specifications. Where excavation has been carried below grade, the space shall be filled with clean, thoroughly compacted earth, except that where excavations for foundations are carried below grade, the space shall be filled with concrete of the same class as that of the structure. All excavation shall be kept free of water while construction is in progress.

2-05. Trenching. - Pipe trenches shall be excavated true to line and grade and of sufficient width to afford six (6) inches clearance between trench wall and extreme outside dimension of the pipe. In the excavation of pipe trenches, beds of clean, well tamped earth shall be provided, so placed as to insure that the full length of the pipe barrel and at least 25% of the pipe circumference is supported by a firm but slightly yielding bed.

2-06. Trench backfill. -

(a) As soon as practicable after the pipe has been installed and tested, if required, backfilling of the trench shall begin and shall thereafter be prosecuted expeditiously. The space between pipe and sides of the trench shall be packed full by hand shovel with selected sand and thoroughly compacted with hand tamper as fast as placed up to a level one (1) foot above top of pipe. The fill shall be placed uniformly on both sides of the pipe and neither horizontal nor vertical alignment of the pipe shall be disturbed.

(b) The remainder of the trench shall be filled with clean earth free from vegetation or other objectionable material, and compacted as directed; either by puddling, rolling or mechanical tamping dependent upon the method best suited to the materials, sufficiently to prevent subsequent settlement.

(1) Puddling. - If backfill material is compacted by puddling it shall be done by depositing the material in water. Where dams or dikes are constructed in trench to hold back water used for puddling, they shall be compacted by mechanical tamping as described below.

(2) Rolling. - If backfill material is compacted by rolling, a satisfactory roller or a tractor with caterpillar tread shall be used after the trench has been filled, care being exercised to compact thoroughly the material close to the bank as well as that in all other portions of the trench.

(3) Mechanical tamping. - Where impractical to compact by other methods and under all roadways, service drives, sidewalks, and other travelled areas, the backfill material shall be compacted by mechanical tamping. Clean, refuse-free material shall be placed in six inch layers and each layer thoroughly tamped with an approved mechanical tamper. If required, material shall be wet by sprinkling before rolling or tamping.

(c) Whatever method is used, care shall be taken that lumps shall not become nested and that all voids between lumps shall be completely filled with fine material. No large masses of backfilling material shall be dropped into the excavation, as from a grab bucket, in such manner as to disturb pipe or structure.

2-07. Fill. - Material used for fill and structure backfill shall be clean earth free from vegetation or other objectionable material and shall be placed in thoroughly compacted layers not more than six (6) inches in depth.

(a) Fill around salt storage tanks beneath the foundation and the slab of the pump house shall be placed in six-inch (6") layers and thoroughly compacted by mechanical tamping.

2-08. Borrow. - If borrow is required, it shall be taken only from approved locations. Borrow pits shall be so excavated that drainage is provided and shall not be left in unsightly or unsanitary condition. Maximum soil borrow haul shall not exceed two (2) miles.

2-09. Spoil. - Surplus material from excavation not required or unsuitable for fill shall be wasted as directed, maximum haul not to exceed three (3) miles.

2-10. Planting. - The exposed surfaces within the fenced area of the water softening plant of the berms, backfill, trenches or other earth which has been disturbed by the contractor's operation shall be dressed with four inches (4") of topsoil, fertilized and seeded to grass, except that, if completion of the work should occur after 15 November and before 1 March, the planting shall be omitted and adjustment in the contract price will be made, in accordance with clause 3, of U. S. standard form no. 23a. Planting procedure shall be as follows:

(a) Lime and fertilizer shall be uniformly spread over the area and thoroughly disced, harrowed or raked into the top one and one-half ($1\frac{1}{2}$) inches of surface, and watered. The lime will be applied at the rate of 20 pounds per 1000 square feet and fertilizer at the rate of 12 pounds per 1000 square feet at least three (3) days before seeding. The lime shall be an approved hydrated agricultural lime. The fertilizer shall be a ready-mixed fertilized or organic base bearing analysis of a recognized authority. Formula for the fertilizer shall be 6% nitrogen, 8% phosphoric acid, and 6% potash. Both lime and fertilizer shall be delivered on the job in the manufacturer's container, plainly marked and unopened.

(b) The seed shall be delivered to the job in original containers showing the guaranteed seed mixture, which shall contain the following percentages by weight:

80% Bermuda Grass
20% Red Top (Herd Grass)

No seed in the mixture shall show a purity of less than 90% or germination quality of less than 85%. The seed shall be uniformly sown, at the rate of 7 pounds per 1000 square feet of area, by hand or approved seeding equipment. The surfaces of the seed bed shall then be lightly raked or otherwise worked to cover the seed with a layer of soil not more than one-fourth ($\frac{1}{4}$) inch in depth, after which it shall be rolled with an approved lawn roller, weighing not more than two hundred ten (210) pounds per foot of width, and watered with a fine spray.

SPECIFICATION NO. 41919

(c) No lime, fertilizer or seed shall be applied when the wind is strong or when the soil is extremely wet or otherwise unworkable. No rolling shall be done if precipitation after seeding should make the operation detrimental to the seed bed. The contractor shall notify the officer in charge and receive his approval before performing any planting operation. All seeded areas shall be maintained by watering, mowing, and weeding for a period of thirty (30) days after rolling has been completed.

SECTION 3. GENERAL CONSTRUCTION

3-01. Demolition. - The contractor shall prosecute the necessary demolition in order to provide the alterations as shown in the Salt Storage Room of Building No. TC-508. Demolition shall include the removal of the existing wood floor construction, interior concrete piers and sliding doors. The work of demolition shall be executed in a careful and orderly manner with the least possible disturbance to the occupants of the building and provisions shall be made to protect the building against the intrusion of wind and water until the condition of the new work has eliminated such possibility. Any refuse materials realized in the course of the demolition shall be hauled to a dump located not more than three miles from the building.

3-02. Concrete. - Concrete work including reinforcing shall be in accordance with specification 13Yd, except as modified herein-after:

(a) Concrete for reservoir and tank construction. -

(1) Concrete for reservoir shall be air-entrained, class E-1. Concrete for salt storage tank shall be air-entrained F-1. Floor and wall of reservoir shall be placed in single pours respectively. Floors and walls of the salt storage tanks shall be placed monolithically. Internal vibrators shall be used for compacting all of the concrete.

(2) Forms. - Forms for exposed surfaces shall provide a special smooth finish. Other forms shall conform to paragraph 4-02 of specification no. 13Yd. Form ties shall be in accordance with paragraph 4-01 of specification no. 13Yd, for watertight work.

(3) Placing and curing shall be in accordance with sections 6 and 7 of specification no. 13Yd, except as specified otherwise herein. Under floor slabs, the subgrade shall be brought to a smooth surface compacted thoroughly and the entire subgrade under the slab covered with heavy building paper immediately before the concrete is placed. The subgrade shall be maintained in a smooth condition during the term of the placing of the paper and concrete. Walls shall be placed in horizontal lifts not to exceed two (2) feet. The concrete shall be deposited at frequent intervals around the periphery. No temporary joints shall be allowed to become "cold" before the adjacent concrete is placed. The time interval shall not exceed forty-five (45) minutes. All concrete shall be water-cured for not less than fourteen (14) days. Floor of reservoir, after pouring, shall be kept saturated with water until walls have been constructed.

SPECIFICATION NO. 41919

(4) Finishing shall be in accordance with paragraph 8-01 of specification no. 13Yd, except as specified otherwise herein. A floated finish shall be provided for floor slabs; the surface of the slab shall be struck off true at the finish floor level; all surface water shall be removed and the surface floated to a smooth, hard, reasonably non-slip finish, using a wood float.

(5) Joint between the wall and floor slab of the reservoir shall be made by a continuous key and copper water stop. A copper strip not less than ten (10) inches wide and weighing not less than twenty (20) ounces per square foot shall be placed to span the joint, the strip being imbedded in the middle of the wall and centered on the joint. Joints in copper strips shall be lapped, locked, and soldered.

(b) Concrete for building and miscellaneous structures. -

(1) Concrete shall be class D-1. The earth under foundations, and under slab-on-grade, shall be wetted as directed, immediately before the concrete is placed.

(2) Forms for exposed exterior concrete shall provide a special smooth finish. Other forms shall conform to paragraph 4-02 of specification no. 13Yd.

(3) Floor finishes. - Interior concrete floors shall be given a dusted-on finish in accordance with paragraph 9-04 of specification no. 13Yd. The wearing surface of exterior concrete platforms shall be finished in accordance with paragraph 8-02, II, B, of specification no. 13Yd.

(c) Setting miscellaneous material. - Ladder fastenings, pipe connections, pipe sleeves, and all other material in connection with the concrete work shall be placed and secured in position before the concrete is poured.

3-03. Masonry. -

(a) Materials. - Masonry cement shall be type II conforming to specification no. SS-C-181b. Sand shall be an approved grade, clean, and free from dirt and other impurities. Mixing water shall be clean and free from excess acids and alkalis and other deleterious matter. Concrete masonry units shall conform to specification no. SS-C-621 type I (load bearing); shall be standard sizes and shapes including necessary closers; and be adequately cured before shipment.

(b) Mortar shall be mixed in the proportions of one part masonry cement and three parts sand, by volume, and shall be in place before initial setting has occurred.

(c) Installation of masonry. - Joints in concrete masonry units shall be approximately $\frac{1}{2}$ " in thickness. All exposed interior and exterior joints shall be slightly concave, tooled joints. All beds on which units are laid shall be clean and thoroughly wetted before being laid. Masonry shall be laid plumb and true to line with accessory items built in as the work progresses. The masonry units shall be laid with cells vertical. The first course shall be laid in a full bed of mortar for the full width of the joint. Succeeding courses shall have the bed joints formed by applying mortar to the entire top surface of the inner and outer face shells. Head joints shall be formed by applying the mortar for a width of about 1" to the ends of adjoining units previously laid. Suitable bolts, metal wall plugs and other approved metal fastenings shall be provided and installed for securing other work to masonry. On completion, all masonry surfaces shall be pointed where necessary and the faces scrubbed and rinsed thoroughly with clean water.

3-04. Miscellaneous steel and iron work shall be well formed as to shape and size with sharp lines and edges. Shearing and punches shall leave clean, true lines and surfaces. Materials shall be clean, free from mill scale, flake, rust and pitting. Steel shall be stock material of commercial quality. Fabrication shall equal best practice in modern shops and welding shall be done by qualified welders. All steel and iron work, except anchor bolts shall receive a shop coat of red lead paint. Cast iron manhole frames and covers shall conform to specification no. 42Ya and shall be pattern no. 6, as shown on plate no. 13.

3-05. Roofing and sheet metal work. -

(a) Built-up roofing. - Roofing materials and installation shall conform to the applicable requirements of specification no. 7Yg and shall be type 4 TCS. Surfacing material may be gravel, crushed stone or slag.

(b) Sheet metal for flashing wood manhole covers shall be zinc-coated sheet steel in accordance with the requirements of paragraph 1-23 of specification 7Yg and shall be type 4, class e, specification no. 47S29c. Flashing shall be applied in accordance with the applicable requirements of paragraph 3-17 of specification no. 7Yg.

3-06. Metal windows. -

(a) General requirements. - Metal windows shall conform to the applicable portions of specification no. 10Yc except as modified herein. Windows shall be made of steel and shall be equipped with all necessary hardware; and shall be commercial

SPECIFICATION NO. 41919

pivoted type. Loading tests will be waived in cases where the contractor furnishes satisfactory evidence including affidavit from the sash manufacturer that units of a similar type have met such tests. Windows shall be putty glazed from the inside.

3-07. Carpentry. -

(a) General requirements. -

(1) Materials and methods of installation shall conform to the applicable requirements of specification no. 28Yc, except as modified by the drawings and herein. Lumber items shall have a moisture content of not more than 19%; millwork and finish carpentry items shall have a moisture content of not more than 15%. Wood material, except manhole covers and millwork, shall be No. 2 southern pine or no. 2 Douglas fir. Material for millwork shall be grade C Southern Pine or Douglas Fir. Material for wood manhole covers shall be No. 1 common grade of Cypress.

(2) Hardboard shall be class B in accordance with specification no. LLL-F-311, one-quarter inch ($\frac{1}{4}$ ") in thickness, four feet (4') in width, and of lengths that will provide a minimum of joints. The board shall be secured with 3d blued lath nails spaced four inches (4") on centers along edges and eight inches (8") at other bearings. Joints shall occur over solid bearings only, additional nailers shall be installed where necessary.

(b) Door and window frames. - Frames shall be constructed to details and in the case of the door jambs, shall be blocked solidly behind the butts.

(c) Doors shall be 1-3/4" in thickness and of the design indicated.

(d) Caulking. - This work includes the caulking of joints at the head and jambs of the door in the pump house and elsewhere, as shown or required, to provide watertight construction. The caulking material shall be as approved, non-staining, light gray in color and shall be applied with a gun in an approved manner.

(e) Installation of finish hardware. - All items of finish hardware called for in another section shall be carefully fitted and securely attached upon completion of the work. All hardware shall be demonstrated to work freely; all keys shall be fitted into their locks and the keys delivered to the officer in charge.

3-08. Glazing. -

(a) General requirements. - The work includes furnishing and setting all glass necessary for the proper completion of the building. Glass shall be in accordance with specification no. DD-G-451a. Putty for glazing in wood shall be Type II in accordance with specification no. TT-P-791a or Type I in accordance with specification no. TT-P-781a. Putty for glazing in metal shall be Type II in accordance with specification no. TT-P-781a.

(b) Clear sheet glass. - All remaining glass shall be Type II, clear sheet glass, B quality and shall be double strength for sash glazing and 7/32 inch in thickness where used in the exterior doors.

(c) Workmanship. -

(1) All glass shall be accurately cut to fit the openings and shall be set with equal bearing on the entire width of the pane. Glass shall be properly bedded, puttied, back-puttied and set without springing or forcing. Glass in the exterior doors shall be held in place with stop beads. Stops shall be removed and the glass set with the back and face puttied and then the stops shall be reset. Glass in the commercial pivoted windows shall be bedded back-puttied and secured with glazing clips and puttied on a bevel. The corners in putty shall be carefully made and all excess putty shall be removed and surfaces cleaned. On completion, all dirt and stains of every kind shall be removed and the glass shall be washed.

3-09. Hardware. -

(a) General. - All hardware shall conform to the applicable requirements of specifications nos. FF-H-106a, FF-H-111a, FF-H-116b and FF-P-101b. Hardware not specified otherwise shall have a U. S. 10 finish. Two keys shall be provided for each lock. One flat brass key tag approximately 1-1/8" in diameter and a brass chain shall be provided for each key; tags shall be numbered as directed.

(b) Schedule. -Building No. TC-508

(1) Door A shall have

1 1/2 pair butts type 2010 1/2 P, 4 1/2" x 4 1/2"

1 lock set 86N5

- (2) Door B shall have
 - 1½ pair butts type 2010½P, 4½" x 4½"
 - 1 lock set 86L5
 - 1 stop type F1322
- (3) Doors C each shall have
 - 1½ pair butts type 2010½P, 4½" x 4½"
 - 1 lock set 86N5
 - 1 stop type F1322
- (4) Doors D each shall have
 - 1½ pair butts type 2010½P, 4½" x 4½"
 - 1 lock set 86B5
 - 1 door holder type 1162, size C

Pump House. -

- (1) The door shall have
 - 1½ pair butts type 2010½P, 4½" x 4½"
 - 1 lock set 86B5
 - 1 door holder type 1162, size C

Transmitter Shelter. -

- 2 padlocks, type EPA, 1½"
- 2 hasps type F1405C, 6" long

3-10. Painting. -

(a) General requirements. -

(1) Building No. TC-508. - Surfaces to be painted shall include new and existing exterior wood, putty and ferrous metal on the three walls of the north wing; new and existing interior woodwork, wall and ceiling surfaces in the toilet, utility, chlorinator and storage rooms; new wood and hardboard surfaces only in the equipment room. Piping shall be painted as hereinafter scheduled.

(2) Pump house. - Surfaces to be painted shall include all exterior masonry and metal surfaces, interior and exterior surfaces of door and frame and window. Equipment and piping shall be painted as hereinafter scheduled.

(3) Reservoir. - Surfaces to be painted shall include vents and overflow piping, fittings, manhole frames and covers, and valve stands; valve stem extensions and supports, flange piping and bolts and fittings occurring in connection with flange piping inside the reservoir.

SPECIFICATION NO. 41919

Paint shall be applied to thoroughly clean surfaces only and shall be worked thoroughly into all joints, crevices, and open spaces. Metal surfaces shall be smooth and free of loose and disintegrated paint, grease, and scale before the field coats are applied. Colors and shades of colors shall be as approved. Finished surfaces shall be smooth, even, and free of defects. The number of coats of paint herein specified shall be in addition to the shop priming coats; the touching-up of shop and factory-finished coats is included in the work of this contract.

(b) Materials. - Materials shall be in accordance with the standard specifications listed; those not covered by such standards shall conform to the requirements given hereinafter and shall be approved brands. Paints and materials therefore shall be delivered in unbroken original packages bearing the manufacturer's name and brand designation. In paints containing both linseed oil and varnish, all ingredients shall be mixed thoroughly prior to the addition of the varnish; all paints containing varnish shall be mixed immediately prior to use and shall not be stored.

(c) Exterior painting. -

(1) Woodwork and putty. - Paint shall be ready-mixed lead and oil paint conforming to specification no. TT-P-104. Priming coat shall consist of paint mixed with one (1) pint of linseed oil to the gallon. Second coat shall consist of paint mixed with one (1) pint of turpentine to the gallon. Third coat shall consist of paint without admixture. New work shall receive three coats as specified above; existing work shall receive two coats as specified for second and third coats above.

(2) Metal. - Except for non-ferrous metal, all metal, excluding zinc-coated, shall be touched up with red lead conforming to specification no. TT-P-86a followed by two coats of paint of the kind specified above for second and third coats on wood. Zinc-coated metal shall be primed with one coat of type II, class B primer in accordance with specification no. TT-P-641 and then given two finish coats as specified for exterior woodwork.

(3) Concrete masonry units shall be painted two coats of water cement paint conforming to specification no. TT-P-21, Type II, Class A. Mixing shall be in accordance with manufacturer's directions. After the surfaces have been cleaned, they shall be thoroughly wetted with a fine spray of water immediately before applying the paint. Paint shall not be applied to surfaces containing excessive moisture to the extent

SPECIFICATION NO. 41919

that they are dripping wet. Paint shall be thoroughly mixed and kept thoroughly stirred during application. The first coat shall be applied with a scrub brush having coarse bristles not over 2½" long. The brush shall be dipped into the paint and paint thoroughly scrubbed into the irregularities of the surfaces using a circular motion so as to completely cover all surfaces. The paint shall be applied to a wet edge and laps shall not be made. After paint has hardened sufficiently to prevent damage to the paint film, it shall be kept damp until hard by spraying lightly with a fine spray of water. The first coat shall be sprayed lightly prior to applying the second coat. The second coat shall be applied with a long bristle brush using horizontal sweeping motions; brush shall be kept full and the paint flowed on, with care being taken to avoid laps and going back over newly painted surfaces. The second coat shall be lightly sprayed with water as described for the first coat until all danger of cracking has been overcome. No cement water paint shall be applied through rainy periods.

(d) Interior painting. -

(1) Exposed woodwork. - Interior exposed woodwork and hardboard shall be primed with one coat of paint conforming to specification no. TT-P-51b followed by two finish coats of paint conforming to specification nos. TT-P-51b and TT-E-506b mixed in equal proportions.

(2) Miscellaneous metal. - Paint in accordance with specification no. TT-P-86a shall be used for touch-up of shop painted surfaces and all exposed metal surfaces and putty shall be given two additional coats of paint as hereinbefore specified for interior woodwork.

(3) Electrical items. - Electrical switches, fuse boxes, and control panels shall be color painted to conform to Government Safety Code Requirements. The conduit in room spaces where paint is applied to wall surfaces shall be painted to match the adjacent finish.

(4) Mechanical equipment shall be painted in accordance with the requirements of specification nos. 21Yc and 36Ya, except that lead and oil paint colored as directed shall be substituted for aluminum paint.

(e) Exterior and interior metal work at the reservoir shall be given two (2) coats of an approved asphaltic paint.

SPECIFICATION NO. 41919

(f) Clean up. - Paint shall be removed immediately where spilled or splattered on surfaces adjacent to the work, including fixtures, glass and fittings. The premises shall be kept free at all times from accumulation of waste material and/or rubbish resulting from the work, and upon completion of the work, all tools, scaffolding, surplus materials and rubbish shall be removed and the premises left clean.

SPECIFICATION NO. 41919

SECTION 4. PLUMBING

4-01. General requirements. - The work includes the provision and installation of all fixtures, accessories, material, appurtenances and equipment for a complete plumbing installation. All piping shall be inspected, tested and approved before being covered, buried or concealed. Except as specified otherwise hereinafter, all work shall conform to specification nos. WW-P-541a, 31Yc and material specifications hereinafter listed.

4-02. Materials. -

(a) Water piping above ground shall be standard weight, zinc-coated steel pipe, in accordance with specification no. WW-P-406a.

(b) Soil pipe shall be extra-heavy cast iron, in accordance with specification no. WW-P-401.

(c) Sanitary piping above ground shall be standard weight, zinc-coated, steel pipe, in accordance with specification WW-P-406.

(d) Drainage fittings above ground shall be cast iron, recessed and banded, screw-jointed, long radius, drainage pattern, in accordance with WW-P-521b.

(e) Water pipe fittings shall be type 1, class A, zinc-coated cast iron, in accordance with specification no. WW-P-501b, or class B, zinc-coated malleable iron, in accordance with specification no. WW-P-521b.

(f) Unions shall be type B (zinc-coated), in accordance with specification no. MIL-U-16365.

(g) Lead for caulking shall conform to specification no. QQ-L-156.

4-03. Fixtures. - Fixtures, trimmings, fittings, accessories and miscellaneous plumbing supplies shall be in accordance with specification nos. WW-P-541a and 31Yc. All trimming fittings shown and/or described therein for the fixture specified herein, including compression stop, shall be provided. The trimmings, fittings, and accessories shall be brass or red metal, nickel or chromium plated.

(a) Water closet, no. E-46-F, complete with seat CEB.

(b) Cast-iron sink, no. R-30-L, figure 29, with faucet, pattern FL, figure 88.

(c) Miscellaneous plumbing supplies as follow shall be provided and installed where shown: cleanout plug, figure 105, less cover; floor drain, figure 108; coat hook, type 420, figure 122; toilet paper holder, type 435, figure 129; and towel cabinet, type 445, figure 133.

4-04. Bacteriological tests. - Before plumbing is placed in service, all water piping shall be thoroughly flushed out on successive days and bacteriological analysis made on samples of water obtained from outlets in the building. Should system be contaminated, flushing shall be repeated, and if necessary, chlorine or hyperchlorite added to the incoming water and allowed to stand overnight, and tests repeated until the officer in charge is satisfied that the entire system has been properly sterilized.

SPECIFICATION NO. 41919

SECTION 5. INTERIOR ELECTRICAL

5-01. General requirements. -

(a) The work shall include the provision of complete interior wiring systems for the purpose of supplying current to lighting, receptacles, and motors as specified herein respectively for building number TC-508 and the new brine tank pump house, including removals and circuit revisions, conduit, outlet boxes, wire, lighting panel, wall switches, receptacles, exterior wire racks, service entrances, fused switches, motor starters, interior wiring for remote water level indication, lightning arresters, lighting fixtures, lamps, and all appurtenances required to complete the systems ready for operation.

(b) All work shall be done as above specified, as shown on drawing and, unless otherwise shown or specified, in accordance with specification no. 9Yf and other standard specifications listed therein.

5-02. Coordination. - All electrical work shall be done in coordination with the other trades at proper times to precede removal of existing structures and in anticipation of and during new construction as conditions may require, to avoid confliction.

5-03. Outlet boxes. - Outlet boxes wherever flush shall be four inch (4") square zinc-coated boxes with a cover in each case suitable for the respective purpose. All boxes for surface mounting shall be of the cast threaded hub type.

5-04. Local wall switches. - Wall switches shall be single-pole or three-way as shown, toggle type, "T" rated, 20-ampere, 125-volt, in composition base.

5-05. Convenience receptacles. - Convenience receptacles shall be duplex, 15-ampere, 125-volts, "T" slot, double sided contacts with four (4) terminal screws, in composition base.

5-06. Fused safety switches. - All fused safety switches used as motor disconnects or manual control shall be type "A", style "A" with quick-make and quick-break mechanism. All switches in the brine pumping room shall be in type 4 enclosures.

5-07. Magnetic motor starters shall be of the quick-make and quick-break type having overload and low voltage release and with hand reset overload trip mechanisms, in N.E.M.A. type 4 enclosures. All magnetic starters will be furnished under another section of this specification but shall be wired and connected by

the electrical contractor. Starters shall have 120 volt operating coils. There shall be a start and stop button, integral with each motor starter or a separate button installed adjacent to the starter at the pump house. These shall function in conjunction with a single start and stop button in Building No. TC-508, through a transfer switch, as specified hereinafter.

5-08. Conduit. - Conduit shall be exposed on the surface of construction and shall be zinc-coated for both inner and outer surfaces. Standard lengths shall be threaded previous to treatment. All conduit shall be cut with a hacksaw and reamed to size. No bends shall be made of more than 90° and manufactured elbows shall be used on one inch (1") size and above.

5-09. Wires and cables. -

(a) No wire smaller than #12 AWG shall be used, unless otherwise specified.

(b) All wire installed in conduit in dry locations shall be type RH.

(c) All wire in conduit installed wholly or in part outside of building, in or under floor slabs or underground, shall be type RHL.

5-10. New lighting panel (Building No. TC-508) shall consist of the number of circuits noted, single, quick-make and quick-break branch circuit breakers rated 20 amperes feeding from a 120/208 volt, 3 phase, 4 wire bus. The breakers shall be assembled on a heavy formed steel back plate drilled for universal mounting of 50 ampere frame size breakers and shall be arranged for easy removal from the front without disturbing adjacent units. Lugs only to be furnished on the mains. Breakers to be equipped with trip free handles. The breaker mechanism shall be mounted in a hot moulded phenolic case sealed to prevent unauthorized tampering with the fixed calibration. Tripping shall be accomplished by means of a bi-metallic thermostatic latch accurately calibrated for the specific rating. The cabinet shall be surface type made of not less than code gauge steel and shall have a turned-in flange around the outside edges for fastening the trim. The trim shall be equipped with a hinged door having a latch and lock and a half round moulding around the edge for stiffening. Exposed surfaces of the cabinet shall be primed for finish painting and shall have a removable steel barrier.

5-11. Lighting fixtures "A", "B", "C", and "D" shall be of the highest quality for the applicable designs as identified by the 9Yf number shown on the electrical drawings.

OSI ved 11/18 2017
SPECIFICATION NO. 41919

5-12. Building No. TC-508. - There exists in this building three service switches, a 60-ampere, a 200-ampere and a 30-ampere, all four pole SN which are to remain. The 30-ampere switch is used to feed two existing lighting branch circuits which shall be removed from the switch and rerouted to the specified new panel. The 30 ampere switch shall then be utilized to feed the new panel. The existing lighting fixture, switch and branch circuit shall be removed back to the preceding outlet and all unused boxes capped for painting-in. The new fixtures, wall switches and receptacles specified herein shall be installed on new circuits as shown.

5-13. Brine pump house. - This will be new construction requiring a new service entrance. The installation shall be as shown. All devices type 4 enclosure.

5-14. Electrical current. - The current serving each building will be three-phase, four-wire, 120/208 volts, 60 cycle.

5-15. Secondary racks shall be heavy duty type, hot dip galvanized, of not less than no. 9 gauge steel, having points on twelve inch (12") centers welded or strongly riveted to the channel. Four wire and two wire racks shall be attached by three anchor bolts, set in the concrete roof construction. Set rack as high as possible horizontally.

5-16. Spool insulators shall be of the wet process type, standard three inch (3") overall diameter.

5-17. Pump start-and-stop relays. -

(a) There shall be provided, in the brine pump house, a single pole, double throw switch, in type 4 enclosure, manually operated, and wired into the motor control circuit in a manner to permit the selection of either one of the two pump motors for operation from a remote start-and-stop button located in building no. TC-508 over approximately 4500 feet of #16 wire run.

(b) Make all connections to and between devices and to service entrances to establish approved operation.

5-18. Interruptions to service. - The contractor shall carefully plan the electrical work in a manner to keep interruptions to service at a minimum. If and when interruptions to service become unavoidable, the contractor shall so notify the officer in charge 72 hours preceding and shall interrupt service only at such times and for such durations as directed by him.

SECTION 6. EXTERIOR ELECTRICAL

6-01. General requirements. - The work shall include the provision of a four-wire service drop and a two-wire transmission drop from the proposed tank pump house to the adjacent pole on Sixth Street, including a new four spool wire rack, transmission wire supports and three fused cutouts on the pole, the underground extension of the control cable back to building no. TC-508 and transmission wires to building no. TC-501, and all connections to leave all services in readiness for operation. The wire racks are specified elsewhere herein. The transmission wires for water level gauge transmitter shall be carried to the service pole separately from the power service. Anchor bolts shall be set at the pump house.

6-02. Fused cutouts. - There shall be a 15,000 volt fused cutout in each primary wire connected to the transformer stations. The ampere ratings shall be in accordance with standards set up for good practice and adequate protection for the several conditions involved. The cutouts shall be of the open trip-out type for cross arm mounting. They shall be point pressure type equipped with solderless connector terminals, swivel type mounting brackets, positive tripping mechanism and lifting hooks for easy installation and removal of cartridge. The thermal element of the fuse link shall be held under tension in the center of the cartridge tube surrounded by a dead air space to prevent carbonization of the cartridge. Flash-over values shall be in accordance with NEMA specifications.

6-03. Secondary racks shall be heavy duty type, hot dip galvanized, of not less than no. 9 gauge steel, having points on 12-inch centers welded or strongly riveted to the channel. The four-wire service wire rack and two-wire transmission rack shall be attached by anchor bolts set in the concrete roof construction. Set racks as high as possible horizontally.

6-04. Spool insulators shall be of the wet process type, standard 3-inch overall diameter.

6-05. Remote control and water level wiring. -

(a) Provide an eight (8) conductor cable extending from the brine pump house back to building no. TC-508 and terminate the same in readiness for the extension, under "Interior wiring", to the remote motor control button and water level indicator. The cable shall be laid in the same trench, provided under another section, for the brine piping. The cable shall contain eight (8) solid #14 AWG conductors, covered with 3/64 inch thick, color

SPECIFICATION NO. 41919

coded, plasticized polyvinyl compound 600 volt insulation. The conductors shall be cabled, bound with cable tape and provided with a 4/64 inch thick plastic jacket. A .010 inch thick flat bronze tape applied with approximately a 1/4 inch overlap shall then be installed and the cable be given a 2/64 inch thick outer covering of plasticized polyvinyl compound.

(b) Control circuit. - Three conductors of the above cable shall be used to transmit start-and-stop control current from a manually operated selector switch located in building no. TC-508. The selector switch shall consist of a single pole double throw switch wired to select the pump motor to be used.

(c) There shall be provided, at each building, a rigid steel conduit sleeve of approved dimensions for the purpose of protecting the cable at entrance to the respective building. The conduit shall terminate six (6) inches above the floor, within the building and extend five (5) feet beyond the wall to lie on the bottom of the trench and parallel thereto. The terminals in the trench shall be equipped with a standard bushing.

6-06. Extension to water tower. - Two (2) of the cable conductors of the cable shall be extended from the brine pump house to the power service pole and thence along one span of the existing pole line on Sixth Street, two (2) spans on "G" Street, to a service pole twenty feet (20') from the water tower and to the tower. Make all connections to the water level transmitter located in the transmitter shelter at the tower. Use two spool racks on pole and #8 TBWP for this extension.

6-07. Lightning arresters. - There shall be provided at each terminal of the water level two wire transmission circuit (i.e. at the transmitter shelter and at the entrance to building no. TC-501), a suitable two-wire lightning arrester. A #6 bare wire shall be used for the ground connection and, at each location, two (2) ten foot (10') sections of 5/8 copper encased steel ground rod shall be driven not less than twenty-one feet (21') deep. The ground resistance at each rod, previous to connecting, shall be not greater than 25 ohms. If additional material and/or labor is required to obtain the above resistance, payment will be made therefor, as described under clause 4, U. S. standard form 23A.

6-08. Interruptions to service. - The contractor shall carefully plan the electrical work in a manner to keep interruptions to service at a minimum. If and when interruptions to service become unavoidable, the contractor shall so notify the officer in charge 72 hours preceding and shall interrupt service only at such times and for such durations as directed by him.

SECTION 7. BRINE PIPING SYSTEM

7-01. General requirements. - The work includes the provision of underground brine pipe line from the new salt storage tanks to the existing water softening plant together with brine pumps and piping and valves within the pump house and storage tanks; the relocation of brine measuring tanks within the existing water softening plant and the relocation of piping thereto.

7-02. Materials. -

(a) Underground pipe shall be standard weight, black wrought iron pipe, conforming to specification no. WW-P-441b; Joints shall be welded and bends made with wrought iron welding elbows.

(b) Pipe within water softening plant shall be black wrought iron pipe as above except that thread joints shall be used. Fittings shall be cast iron conforming to specification no. WW-P-501b.

(c) Pipe within salt storage tanks and pump house shall be brass conforming to specification MIL-P-2780, grade A. Threaded joints shall be used with brass fittings conforming to specification no. MIL-F-1184.

(d) Gate valves and check valves shall be bronze conforming to specification 66PlA(INT).

7-03. Installation. - Installation of brine piping shall be in accordance with specification 21Yc, except as modified herein.

(a) Underground piping shall have a minimum cover of two feet.

(b) Rods and welding shall be in accordance with paragraph 3-08. Welding may be by either the electric arc or by oxyacetylene method. Proper current and voltage shall be maintained at all times for electrodes of various types and diameter when using the electric arc method. Flame characteristics shall be as recommended by the welding rod manufacturer or as directed with oxyacetylene welding.

7-04. Brine pumps. -

(a) Brine pumps, motors and starters shall be in accordance with the applicable sections of specification no. 66PlA(INT), except as modified herein.

(b) Brine pumps shall be designed to deliver thirty-five (35) gallons of brine per minute, against a total dynamic head of 106 feet.

(c) The pumps shall be of the centrifugal type, and all parts exposed to the corrosive action of the brine shall be bronze, designed and constructed to resist the action of the brine.

(d) Motors shall be drip-proof, designed to operate on 208 volt, 60 cycle 3 phase current. Starting equipment shall be as specified in the electrical section.

7-05. Testing. - All underground piping in the brine piping system shall be left uncovered until tested for leakage at a pressure of 150 pounds per square inch, and defects corrected. Equipment and labor necessary to conduct the test shall be provided by the contractor.

SECTION 8. WATER PIPING

8-01. General requirements. - The work includes the provision of all water piping required to connect the new reservoir to the existing reservoir; the extension of distribution piping; the removal of existing piping; water service line to the salt storage tanks; including all valves, valve boxes, hydrants, fittings and accessories required to provide a complete installation.

8-02. Pipe and fittings. -

(a) Cast iron pipe shall be bell and spigot, cement lined, Class 150, conforming to specification no. WW-P-421.

(b) Cast iron bell and spigot fittings shall be Class D, conforming to A.W.W.A. specifications.

(c) Cast iron flanged pipe and fittings shall conform in weight and dimensions to A.W.W.A. specifications for standard bell and spigot fittings with flanges conforming to American 125 pound standard.

(d) Galvanized wrought iron pipe. - Galvanized wrought iron pipe shall conform to Federal specification no. WW-P-441a.

(e) Malleable iron fittings. - Malleable iron fittings for use with wrought iron pipe shall conform to Federal specification no. WW-P-521b.

8-03. Gate valves. -

(a) Gate valves used with cast iron pipe shall be iron body, bronze mounted, double disc, non-rising stem, open left, two (2) inch square operating nut, A.W.W.A. specifications. Valves shall be installed at exact positions indicated. Before installation, the stuffing box shall be examined and tightened if necessary to prevent leakage. The gate shall be tightly closed before joints are poured.

(1) Gate valves used with cast iron pipe in the distribution system shall be designed for 150 psi working pressure.

(2) Gate valves used with cast iron pipe in the reservoir piping shall be designed for 50 psi working pressure.

(3) Gate valves located within the reservoir shall be designed for 50 psi working pressure and shall have rising stems.

(4) Valves shall have hub ends or flanged ends to fit the pipe for which they are to be used.

SPECIFICATION NO. 41919

(b) Gate valves used with wrought iron pipe shall be bronze, wedge disc, conforming to specification no. W-V-54, Type 1.

(c) Float valves. - There shall be provided a float valve in each salt tank as indicated. Float valves shall be of the angle, single-seating type, having an internal piston, disc holder, and pilot valve. The valve shall have bronze body and bronze internal parts except for the rubber composition discs. The float and lever arm shall be constructed of bronze or other suitable material that will resist the corrosive action of brine.

8-04. Valve boxes. - Valve boxes shall be provided for all underground valves. Boxes shall be cast iron, adjustable as to length, enlarged at the lower end to fit the valve bonnet snugly. The shaft shall be not less than 5-1/2 inches diameter, total weight of box not less than 70 pounds. The word "WATER" shall be cast on the top of the lid. The entire box shall be heavily coated inside and out with asphalt.

8-05. Valve wheels, stem extensions and floor stands. - Valves shall be equipped with operating wheels, stem extensions and floor stands where indicated on the drawings. Stem extensions shall be solid round steel rods of required size and length. Operating wheels shall be cast iron of sufficient diameter to easily operate the respective valves. Floor stands shall be manufacturer's standard, arranged to permit secure bolting to concrete floor, and of required height and size for use with the valves as shown on the drawings.

8-06. Fire hydrant. - Fire hydrant shall be manufactured for 150 pounds working pressure in accordance with A.W.W.A. specifications. It shall be compression type with main valve opening against the pressure. Shoe connection shall be six (6) inches and main operating valve not less than five (5) inches. Hydrant shall have two (2) 2-1/2 inch hose nozzles and one (1) 4-1/2 inch steamer nozzle, all threaded National Standard with cast iron caps secured by chains to the barrel. Hydrant construction shall permit 360 degrees orientation without disturbing sub-surface setting. Operating nut shall match those on existing hydrants. Hydrant shall be constructed for three (3) feet bury and shall be set with steamer connection eighteen (18) inches above the finished grade. It shall be exactly located, plumb, accurately aligned and set upon permanent blocking with concrete backing against solid earth or be secured to the main with rods and clamps. Hydrant shall receive one priming coat and two finishing coats of paint, of color and kind directed.

8-07. Pipe laying. -

(a) Bell and spigot cast iron pipe shall be carefully lowered into trenches with hand ropes or mechanical equipment. Before entering spigot into bell of pipe previously laid, both bell and spigot shall be thoroughly dried and cleaned. A strand of dry braided hemp shall be placed under the spigot and held on either side to support the pipe. The hemp shall enter the bell with the spigot and the pipe shall then be shoved home. The braided hemp shall be of such size that it must be driven into the joint and of sufficient length to lap 2-1/2 inches. After the spigot is shoved home, the hemp shall be driven solidly against the back of the hub, leaving a minimum depth of two (2) inches for the lead. A clay covered runner shall be placed around the joint, and a gate provided slightly off center. The joint shall be completely filled with one pouring. After cooling, the joint shall be caulked with three (3) sizes of caulking tools, beginning with the smallest, the last tool used being slightly smaller than the width of the joint. Hand caulking shall be done with a hammer weighing not less than 3-1/2 pounds. Lead shall conform to specification no. QQ-L-156.

(b) Cutting pipe for closure pieces or for any other reasons shall be done in a neat and workmanlike manner, by an approved method which will not damage pipe.

(c) Before a joint is poured, the last length of pipe shall be brought into alignment. Necessary deflections shall be laid in a smooth curve and the completed main shall have no sharp kinks, either horizontal or vertical.

(d) Maximum deflection for bell and spigot joints shall not exceed $6/D$ inches per linear foot of pipe for pipe.

(e) Dead end castings, toes, crosses, plugs and bends exceeding 22-1/2 degrees shall be securely anchored by concrete backing against solid earth.

(f) Reservoir piping shall be graded as indicated to avoid conflict with existing piping. Distribution piping shall be installed to a minimum depth of three (3) feet.

(g) Cast iron flanged pipe. - All flanges, unless otherwise required, shall have American 125 pound standard drilling. All joints shall be firmly bolted with machine bolts, except that where valves or special castings attach to wall or floor thimbles, stud or tap bolts may be used, provided the number used

SPECIFICATION NO. 41919

and the diameter for each joint is the same for each size of pipe, special, or valve, as recommended by the latest manufacturer's standard for drilling. Bolts and gaskets shall be in accordance with specification no. 66Pla(INT).

8-08. Testing. - All distribution piping and appurtenances shall be left uncovered until testing for leakage, and defects corrected. A constant pressure of 150 pounds per square inch shall be maintained for a period of four (4) hours, and joints inspected and recaulked as required. Equipment and labor necessary to conduct the test shall be provided by the contractor.

8-09. Sterilization. - All cast iron pipe in the reservoir piping, and in the distribution mains, shall be thoroughly sterilized with chlorinated lime containing not less than 50 per cent available chlorine for a twenty-four (24) hour period, where practicable, before being placed in operation. Following the contract period, the heavy chlorinated water shall be flushed from the system with clean water until the residual chlorine content is not greater than two-tenths parts per million (0.20 PPM). All valves in the water lines being sterilized shall be opened and closed several times during the twenty-four (24) hour period.

SECTION 9. MECHANICAL EQUIPMENT

9-01. General requirements. - The work includes the provision of chlorinating equipment and a remote recording altitude gauge, and includes beam scales, chlorine piping and appurtenances as required to provide complete and operating facilities.

9-02. Chlorinator. - The chlorinator shall be in accordance with specification no. MIL-C-17226 (DOCKS), except as modified herein:

(a) The equipment shall be the gas type, designed to feed from 0 to 40 pounds of chlorine per twenty-four (24) hours, using water at approximately 55 pounds per square inch, and discharging into a pipe line under approximately 5 pounds per square inch pressure.

(b) Three (3) copies of complete operating instructions and three (3) copies of spare parts catalog shall be furnished with the equipment.

(c) Spare parts, auxiliary equipment and maintenance tools shall be furnished as specified in paragraph 3.8.

9-03. Remote recording altitude gauge. - The remote recording altitude gauge shall be designed to record in the pumping station the elevation of the water level in the elevated tank, approximately 3,000 feet distant. The equipment shall be designed to operate on 120 volt, 60 cycle current. The system shall consist of the following:

(a) Transmitter. - The transmitter shall be housed in a suitable metal, wall-mounted, moisture-proof case and shall incorporate a pressure measuring element, calibrated for a range of 125.0 feet to 150.0 feet head of water. The transmitter shall send out a time impulse (electrical), the duration of which will be proportional to the measured pressure. The transmitter shall have a built-in indicating scale and pointer.

(b) Receiver. - The receiver shall be housed in a suitable rectangular metal, wall-mounted case with glass door. The receiver shall use a twelve inch (12") circular chart for twenty-four (24) hours rotation having uniform graduations of from 0 to 25 feet. The receiver shall have incorporated in it adjustable high and low alarm contacts to energize an audible alarm consisting of a four inch (4") size bell.

(c) Spare parts. - A one-year's supply of charts and ink shall be provided together with three (3) copies of manufacturer's operating instructions and three (3) copies of spare parts list.

SPECIFICATION NO. 41919

9-04. Exhaust fan for installation in the chlorinating room shall conform to section E-105 of specification no. 66Fla (INT). The fan shall be the propeller type of size and capacity shown on the drawings.

9-05. Electrical heater for installation in the chlorinating room shall be the portable type complete with fan and built-in adjustable thermostat, with an input of not less than 1600 watts per hour and a capacity of 5470 BTU's per hour. Unit shall be designed for 120 volt, 60 cycle, single phase current. The assembly shall be underwriter approved.

SECTION 10. SEWERAGE DISPOSAL SYSTEM

10-01. General requirements. - The work includes the provision of a sewage disposal system including building connection, septic tank, and disposal field as indicated.

10-02. Pipe. -

(a) Terra cotta sewer and underdrain pipe shall conform to specification no. SS-P-361a.

(b) Bell and spigot cast iron soil pipe shall be extra heavy and conform to specification no. W-P-401.

10-03. Pipe laying. -

(a) Terra cotta sewer pipe. -

(1) Each section of pipe shall be brought to exact line and grade, the spigot centered in the bell of the preceding length, and shoved solidly home. The annular space shall be caulked with tight twisted tarred oakum driven solidly against the back of the bell. Joints shall then be made with hot poured bituminous compound. The interior of the pipe shall be kept clean by dragging a swab upstream past each joint immediately after its completion. Any defective joint shall be removed, thoroughly cleaned, and remade.

(2) Bituminous joints shall be used for terra cotta sewer pipe. Heating and pouring shall be in accordance with the manufacturer's recommendations. In pipe having a nominal diameter not greater than ten (10) inches, as many as two (2) lengths of pipe may be pre-jointed in a vertical position, provided that the pipe shall be supported for its full length when lowered into the trench and no joint shall be subjected to strain.

(b) Underdrain pipe. - The pipe shall be laid true to line and grade with open joints, the openings being 3/8 inch wide. The top half of the joint shall be covered with a six (6) inch strip of roofing felt. The pipe shall be entirely surrounded by gravel as shown on the drawing and placed in an approved manner to prevent the admission of fine material to the drain. Sizes shall be as shown. The gravel or broken stone used in the beds shall be hard, tough, clean, and free from dust, loam, clay or other improper substances in quantities sufficient to render it unsuitable.

SPECIFICATION NO. 41919

10-04. Septic tank. - Concrete work shall be in accordance with specification no. 13Yd. Concrete shall be Class D-1. Brickwork shall be in accordance with applicable sections of specification no. 42Ya.

SECTION 11. PAVING, DRAINAGE AND FENCING

11-01. General description. - The work includes the provision of shell rock surfacing; culvert pipe; shell rock gutter around reservoir; third round concrete pipe; the removal of a section of fencing and the installation of a gate, as indicated.

11-02. Rolled shell rock surfacing includes the construction of a surface course, in the area as indicated.

(a) Materials. - The aggregate, including the binder naturally present or added, shall be the grading requirement according to the following composition limits by weight:

Standard Square Mesh Laboratory Sieves

<u>Sieve Designation</u>	<u>Passing Percent by Weight</u>
2½"	100
2"	90 - 100
1"	55 - 90
½"	45 - 75
No. 4	30 - 60
No. 40	10 - 35
No. 200	5 - 20

(1) The material passing No. 4 sieves shall be "binder" and consist of screening, sand and clay or other materials of satisfactory binding value. The material passing the No. 40 sieve shall have a plasticity index not greater than six and a liquid limit not greater than 25, when tested in accordance with A.A.S.H.O. method T-89, T-90 & T-91.

(b) The stone shall be placed in two (2) layers of equal thickness, each layer being thoroughly compacted and sprinkled, if and as directed. The finished stone surfacing shall be brought to a smooth, true surface at the elevations indicated.

11-03. Culverts. -

(a) Materials. -

(1) Culvert pipe. - Culvert pipe indicated as RCP or RC Pipe shall be reinforced concrete pipe, remaining pipe shall be plain concrete. Reinforced concrete pipe shall be standard strength in accordance with AASHO Specification No. M41-49; plain concrete shall conform to AASHO Specification No. M86-49.

(2) Flared end concrete pipe sections shall be precast and the product of an approved manufacturer in accordance with AASHO Specification No. M41-49.

(b) Installation. - Culverts shall be laid to the required grade and shall be set in a bed of clean sandy earth carefully tamped so that the pipe barrel rests for its full length and 25% of its circumference upon a firm but slightly yielding bed. The trench shall be excavated under the outside of the bell. The spigot shall be shoved home, centered in the bell and the annular space completely filled with a mortar composed of one (1) part Portland cement and two (2) parts of sharp, clean sand.

11-04. Catch basins and manholes shall be constructed in accordance with applicable sections of specification no. 42Ya.

11-05. Rock gutter. - The gutter shall be constructed of shell rock, the grading of which shall be as specified for shell rock surfacing.

(a) The stone shall be placed in one layer and thoroughly compacted by tamping. Finished surfaces shall be brought to a true grade at the elevations indicated.

11-06. Third round concrete pipe. - Sections shall be precast and the product of an approved manufacturer in accordance with AASHO specification M41-49.

(a) Installation of these sections shall be in accordance with specifications for culverts.

11-07. Gate. -

(a) Materials. - Fence posts, gates and accessories shall conform to specification no. RR-F-183. The fabric conforming to specification no. RR-F-191. The barbed wire conforming to specification no. RR-F-221b.

(b) Fence posts, gate and accessories. - Gate posts shall be set in concrete footings. The footings shall be 48" deep and 16" diameter and post set 42" in the concrete. Concrete shall be Class D-1 in accordance with specification no. 13Yd. The footings to extend about two inches above the finished grade with the tops and exposed surfaces floated to a smooth finish. Gate shall be twenty (20) foot, double leaf swing type and supplied with an approved type of padlock with three keys furnished for each lock with brass chains on brass identification tags properly marked. Top rail and bottom reinforcing wire shall be provided. An approved type of post top shall be provided for each post having one arm set at approximately 45 degrees carrying three (3) barbed wires.

SPECIFICATION NO. 41919

(c) Fabric shall be Type A, two inch woven wire diamond mesh no. 6 wire, 72 inches in height with the top and bottom edges having a twisted and barbed finish.

(d) Barbed wire shall be Type A, 4 point. Strand to be 12 ga., barb to be 14 ga. Three wires shall be constructed on top of fabric. The uppermost barbed wire shall be approximately 12 inches horizontally from the fabric line.

(e) Installation. - Fencing shall be installed in a workmanlike manner with the wires stretched and fastened securely to the posts and fabric stretched so that there will be no slack edges or warped sections.

(f) Barbed wire fence at salt storage tanks shall be relocated as shown and existing materials, including posts, shall be removed and reset in new position following the same vertical alignment as existing fence.

SPECIFICATION NO. 41919

SECTION 12. BASIS OF BIDS

12-01. General requirements. - Under the bidding items provided for that purpose, bidders shall state prices for each basis of bid given hereinafter. All requirements specified hereinbefore shall govern, unless stated otherwise under any of the following bases of bids.

12-02. Basis of bid for item 1 shall be the entire work complete in accordance with the requirements specified hereinbefore.

12-03. Basis of bid for item 2 shall be the entire work complete in accordance with the requirements specified under basis of bid for item 1 but with the omission of the following: the twelve inch (12") and eighteen inch (18") concrete culvert pipe outfall and catch basins from station 0 + 0 to station 14 + 88. Under this item, the new manhole at station 0 + 43 shall be constructed and the twelve inch (12") concrete pipe stubbed out in each direction and plugged; the eighteen inch (18") concrete culvert pipe under the new entrance drive shall terminate at a point twenty-five (25') from the centerline of the drive; the outlet end of the pipe shall be raised to meet the grade of the existing one-third (1/3) round thirty inch (30") paved ditch and a twelve inch (12") concrete flared end provided.

SPECIFICATION NO. 41919

SECTION 13. BIDS

13-01. Instruction to bidders, U. S. standard form no. 22 revised March 1953 and Invitation for Bids, U. S. standard form no. 20, shall be observed in the preparation of bids. Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Expansion of Water Treatment
Facilities, Camp Geiger,
Specification no. 41919.

Public Works Officer,
Building No. 1005,
Marine Corps Base,
Camp Lejeune, N. C.

13-02. Items of bids. - Bids shall be submitted; in triplicate, on U. S. standard form no. 21 revised March 1953, Bid Form, and in accordance with U. S. standard form nos. 20 and 22, upon the following items:

Item 1. - Price for the entire work, complete in accordance with the drawings and specifications, as defined in basis of bid for item 1.

Item 2. - Price for the entire work, complete in accordance with the drawings and specifications, as defined in basis of bid for item 2.

13-03. Telegraphic modifications of bids in accordance with U. S. standard form no. 22 may be made. Three signed copies of the telegram in a sealed envelope marked "Copies of telegraphic modification of bid for Expansion of Water Treatment Facilities, Camp Geiger, Specification no. 41919, should be forwarded immediately to the office to which the written bids were submitted.

13-04. Reference to addenda. - Each bidder shall refer in his bid to all addenda to this specification; failure to do so may constitute an informality in the bid.

SPECIFICATION NO. 41919

NOTICE

The Government specifications and forms mentioned and other information necessary may be had on application to the Chief of the Bureau of Yards and Docks, Navy Department, Washington 25, D. C. or to the District Public Works Officer, Headquarters, Fifth Naval District, U. S. Naval Base, Norfolk 11, Virginia, or Public Works Officer, Navy Department, Building 1005, Marine Corps Base, Camp Lejeune, North Carolina, except that standard Government specifications, as referred to in paragraph 1-09 shall be obtained from the Chief of the Bureau of Yards and Docks, Navy Department, Washington 25, D. C.

Camp Lejeune, N. C.

7 May 1954

A. J. FAY
CAPT (CEC) USN
Officer in Charge of Construction
Fifth Naval District

FOR:

J. R. PERRY
Rear Admiral, CEC, USN
Chief of Bureau of Yards and Docks
Department of the Navy

LIST OF WAGE RATES
 DECISION N-10,969, 29 March 1954
 CAMP LEJEUNE, ONSLOW COUNTY, NORTH CAROLINA

	<u>Per Hour</u>		<u>Per Hour</u>
Air tool operators (jack-hammerman vibrator)	\$.935	Mason tenders	\$.935
Asbestos workers	2.625	Mortar mixers	.935
" " improvers:		Painters, brush	1.65
1st year	1.25	" , structural steel	2.00
2nd year	1.64	Piledriverman	1.625
3rd year	1.85	Pipe layers (concrete and clay)	.90
4th year	2.07	Plasterers	2.00
Asphalt rakers	1.00	" tenders	.935
Boilermakers-blacksmith	2.90	Plumbers	2.50
" helpers	2.65	Roofers	1.50
Bricklayers	2.50	Sheet metal workers	1.75
Carpenters	1.65	Soft floor layers	1.65
Cement finishers	1.625	Steam fitters	2.50
Electricians	2.35	Stone masons	2.50
Elevator constructors	2.20	Sprinkler fitters	2.68
" " helpers	1.54	Terrazzo workers	2.00
Glaziers	1.50	" " helpers	.85
Iron workers, structural	2.50	Tile setters	2.00
" " ornamental	2.50	" " helpers	.85
" " reinforcing	2.25	Truck drivers	.825
Laborers	.825	Welders - receive rate prescribed	
Lathers	1.75	for craft performing operation	
Marble setters	1.75	to which welding is incidental.	
" " helpers	.85		
Power Equipment operators:		Power equipment operators: (cont'd)	
Backhoes	2.125	Welding machines	2.125
Cranes	2.125	Tournapull	2.125
Cableways	2.125	Air compressors	1.75
Derricks	2.125	Bulldozers	1.875
Beam hoist	2.125	Fireman	1.55
Draglines	2.125	Hoist, double drum	1.875
Dredge or other floating		" one drum	1.625
equipment	2.25	Finishing machine	1.875
Pile drivers	2.25	Mixers (larger than 10-S)	1.75
Pavers	2.125	" (smaller than 10-S)	1.625
Heavy duty mechanics	2.125	Motor graders	2.00
Scrapers, wheel type	2.125	Pumps over 2" discharge	1.75
Shovels	2.125	" under 2" discharge	1.625
Truck cranes	2.125	Rollers, earth	1.87
Tractors with attachments	2.125	" asphalt	2.00
" without "	1.875	Apprentice engineers and	
Trench machines	2.125	oilers	1.55

Year	Category	Value	Year	Category	Value
1933	...	1.00	1933	...	1.00
1934	...	1.00	1934	...	1.00
1935	...	1.00	1935	...	1.00
1936	...	1.00	1936	...	1.00
1937	...	1.00	1937	...	1.00
1938	...	1.00	1938	...	1.00
1939	...	1.00	1939	...	1.00
1940	...	1.00	1940	...	1.00
1941	...	1.00	1941	...	1.00
1942	...	1.00	1942	...	1.00
1943	...	1.00	1943	...	1.00
1944	...	1.00	1944	...	1.00
1945	...	1.00	1945	...	1.00
1946	...	1.00	1946	...	1.00
1947	...	1.00	1947	...	1.00
1948	...	1.00	1948	...	1.00
1949	...	1.00	1949	...	1.00
1950	...	1.00	1950	...	1.00
1951	...	1.00	1951	...	1.00
1952	...	1.00	1952	...	1.00
1953	...	1.00	1953	...	1.00
1954	...	1.00	1954	...	1.00
1955	...	1.00	1955	...	1.00
1956	...	1.00	1956	...	1.00
1957	...	1.00	1957	...	1.00
1958	...	1.00	1958	...	1.00
1959	...	1.00	1959	...	1.00
1960	...	1.00	1960	...	1.00

APPRENTICE SCHEDULE
PERIOD AND RATE*

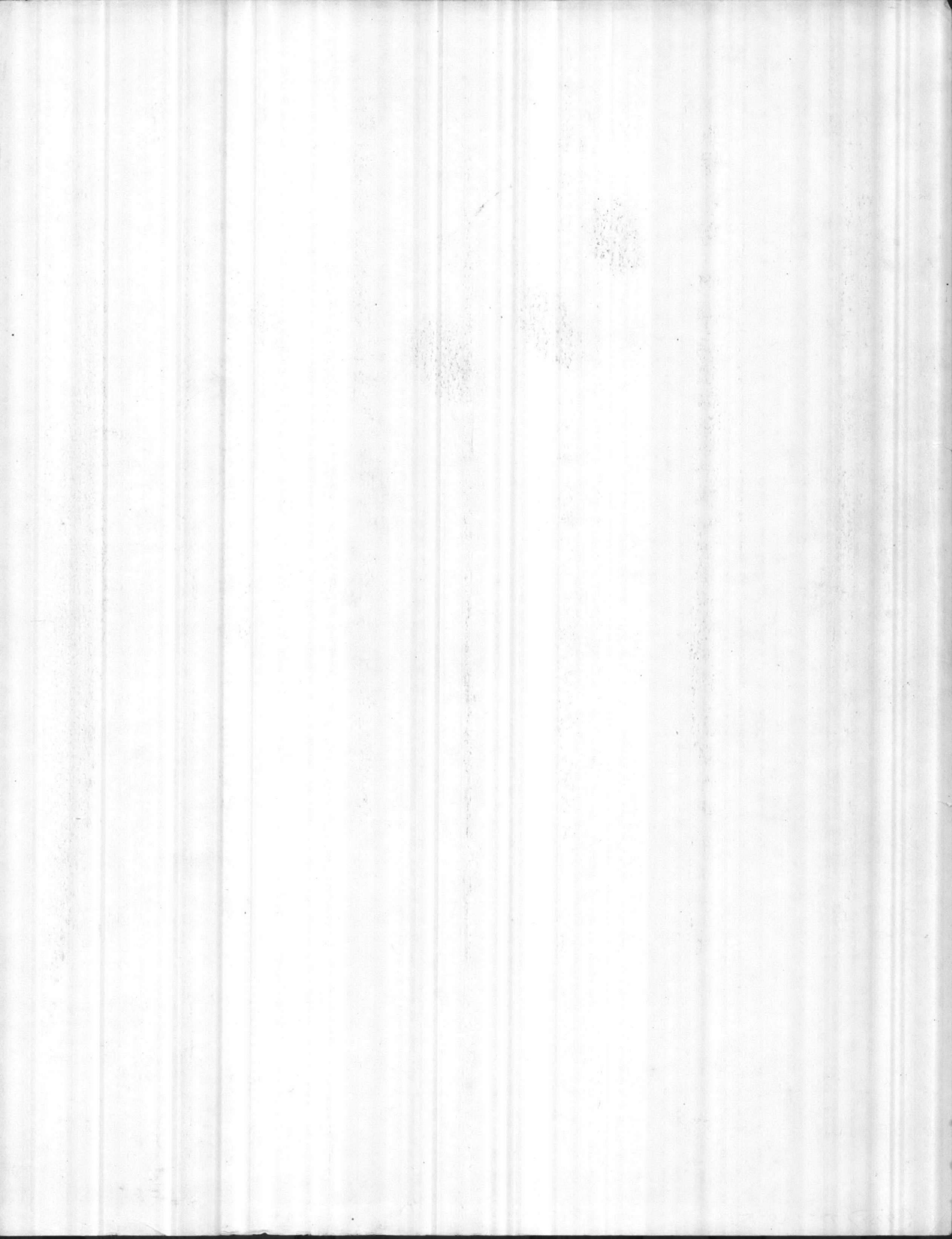
Craft	Interval	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Iron workers	6 mos.	50	60								
" "	Year		66-2/3								
Carpenters	Year	\$1.05	1.15	1.25	1.40						
Electricians	6 mos.	45	50	55	60	65	70	75	80		
Plumbers and Steam fitters	6 mos.	37-1/2	40	45	50	55	60	67-1/2	75		
Sprinkler fitters	6 mos.	54	58	62	66	70	74	78	82	86	90
Sheet metal workers	6 mos.	40	45	50	55	60	65	70	80		

* The apprentice rate is by percentage of the journeymen's rate unless otherwise indicated.

RECEIPTS

No.	Date	Particulars	Amount	Total
1	1912	...	...	...
2	1912	...	...	...
3	1912	...	...	...
4	1912	...	...	...
5	1912	...	...	...
6	1912	...	...	...
7	1912	...	...	...
8	1912	...	...	...
9	1912	...	...	...
10	1912	...	...	...
11	1912	...	...	...
12	1912	...	...	...
13	1912	...	...	...
14	1912	...	...	...
15	1912	...	...	...
16	1912	...	...	...
17	1912	...	...	...
18	1912	...	...	...
19	1912	...	...	...
20	1912	...	...	...
21	1912	...	...	...
22	1912	...	...	...
23	1912	...	...	...
24	1912	...	...	...
25	1912	...	...	...
26	1912	...	...	...
27	1912	...	...	...
28	1912	...	...	...
29	1912	...	...	...
30	1912	...	...	...
31	1912	...	...	...
32	1912	...	...	...
33	1912	...	...	...
34	1912	...	...	...
35	1912	...	...	...
36	1912	...	...	...
37	1912	...	...	...
38	1912	...	...	...
39	1912	...	...	...
40	1912	...	...	...
41	1912	...	...	...
42	1912	...	...	...
43	1912	...	...	...
44	1912	...	...	...
45	1912	...	...	...
46	1912	...	...	...
47	1912	...	...	...
48	1912	...	...	...
49	1912	...	...	...
50	1912	...	...	...

The amount of the balance on hand is \$...



WATER ANALYSIS

THE PERMUTIT COMPANY, 330 West 42nd Street, New York 36, N. Y.

NAME USMC Air Facility DATE 5-12-55 LAB. NO. P-235840
Peter Field Point
 ADDRESS Camp Lejeune, North Carolina DATE SAMPLE COLLECTED 4-29-55 DATE ANALYZED 5-6-55
 COPIES SENT TO Greensboro, N. C. SENT IN BY R. Poore

D. Filtered and Softened water. Blending Cross. (Aerated, Blended, Softened and Filtered).

		PPM as	D.
CATIONS	Calcium..... (Ca ⁺⁺)	CaCO ₃	
	Magnesium..... (Mg ⁺⁺)	CaCO ₃	
	Sodium..... (Na ⁺)	CaCO ₃	345
	.....	CaCO ₃	
ANIONS	Bicarbonate HCO ₃ ⁻	CaCO ₃	328
	Carbonate Alkalinity (CO ₃ ⁻⁻)	CaCO ₃	0
	Hydroxide (OH ⁻)	CaCO ₃	0
	Chloride..... (Cl ⁻)	CaCO ₃	118
	Sulfate..... (SO ₄ ⁻⁻)	CaCO ₃	11
	.....	CaCO ₃	
Total Hardness.....		CaCO ₃	10
Alkalinity A (Methyl Orange).....		CaCO ₃	328
Alkalinity B (Phenolphthalein)		CaCO ₃	0
Free Carbon Dioxide.....		CO ₂	8
Iron (total).....		Fe	0.1
Silica.....		SiO ₂	
Turbidity (after shaking).....			* 0.4
Color.....			23
pH.....			
Manganese Odor		Mn	0.0 0
Actual Hardness (as CaCO ₃)		Results in grains per U.S. Gal.	
Compensated* Hardness (as CaCO ₃)			

(*) Compensated Hardness includes addition for Sodium Salts, and is used for calculating ion exchanger capacities.

* By Hellige 1d 17.1 parts per million = 1 grain per U. S. Gallon. 38A-3-54

WATER ANALYSIS

THE PERMUTIT COMPANY, 330 West 42nd Street, New York 36

NAME: _____ DATE: _____ LAB. NO.: _____
 ADDRESS: _____ DATE SAMPLE COLLECTED: _____
 COPIES SENT TO: _____ SENT IN BY: _____

CALCIUM	Calcium (Ca ⁺⁺)	CaCO ₃				
	Magnesium (Mg ⁺⁺)	CaCO ₃				
	Sodium (Na ⁺)	CaCO ₃				
ANION	Bicarbonate (HCO ₃ ⁻)	CaCO ₃				
	Carbonate (CO ₃ ⁻)	CaCO ₃				
	Hydroxide (OH ⁻)	CaCO ₃				
	Chloride (Cl ⁻)	CaCO ₃				
	Sulfate (SO ₄ ⁻)	CaCO ₃				
	Total Hardness	CaCO ₃				
	Alkalinity A (Methyl Orange)	CaCO ₃				
	Alkalinity B (Phenolphthalein)	CaCO ₃				
	Free Carbon Dioxide	CO ₂				
	Iron (total)	Fe				
	Silica	SiO ₂				
	Turbidity (after shaking)					
	Color					
	pH					
	Total Hardness (as CaCO ₃)					
	Temporary Hardness (as CaCO ₃)					
	Permanent Hardness (as CaCO ₃)					

(*) Temporary Hardness includes addition for Sodium Sulfate and is also for calculating ion exchange capacities. 1.1 parts per million 1.000 p.p.m. U.S.G.P.

DEPARTMENT OF THE NAVY
 DISTRICT PUBLIC WORKS OFFICE
 AND
 OFFICER IN CHARGE OF CONSTRUCTION
 FIFTH NAVAL DISTRICT
 NAVAL BASE, NORFOLK II, VA.

IN REPLY REFER TO:
 D-110A:RLC:v1
 11330

17 APR 1959

From: District Public Works Officer, Fifth Naval District
 To: Commanding Officer, U. S. Marine Corps Air Facility, New River,
 Jacksonville, North Carolina

Subj: Well water check samples from the U. S. Marine Corps Air Facility,
 New River, Jacksonville, North Carolina; analyses of

1. The analyses of the well water check samples, collected by activity personnel on 6 April 1959 and submitted by the addressee to the District Public Works Office Sanitary Engineering Laboratory for analysis, are as follows:

Well No.	Hrs. pump in service at time of sample collection	Total Alkalinity	Phenolphthalein Alkalinity	pH	Chlorides	Lab. No.
		as CaCO ₃ p.p.m.	as CaCO ₃ p.p.m.		as Cl p.p.m.	
2	1	178.	0.0	7.5	17.	WW3-3
3	1½	312.	Trace	8.28	82.	WW3-4
4	1½	342.	Trace	8.32	99.	WW3-5
5	1	278.	0.0	7.8	42.	WW3-6
6	1½	340.	Trace	8.3	126.	WW3-7

2. The samples were received in the laboratory on 9 April 1959. Three wells were in service at the time the samples were collected.

8-20-72

#3 well

Chloride - 275.0 PPM.

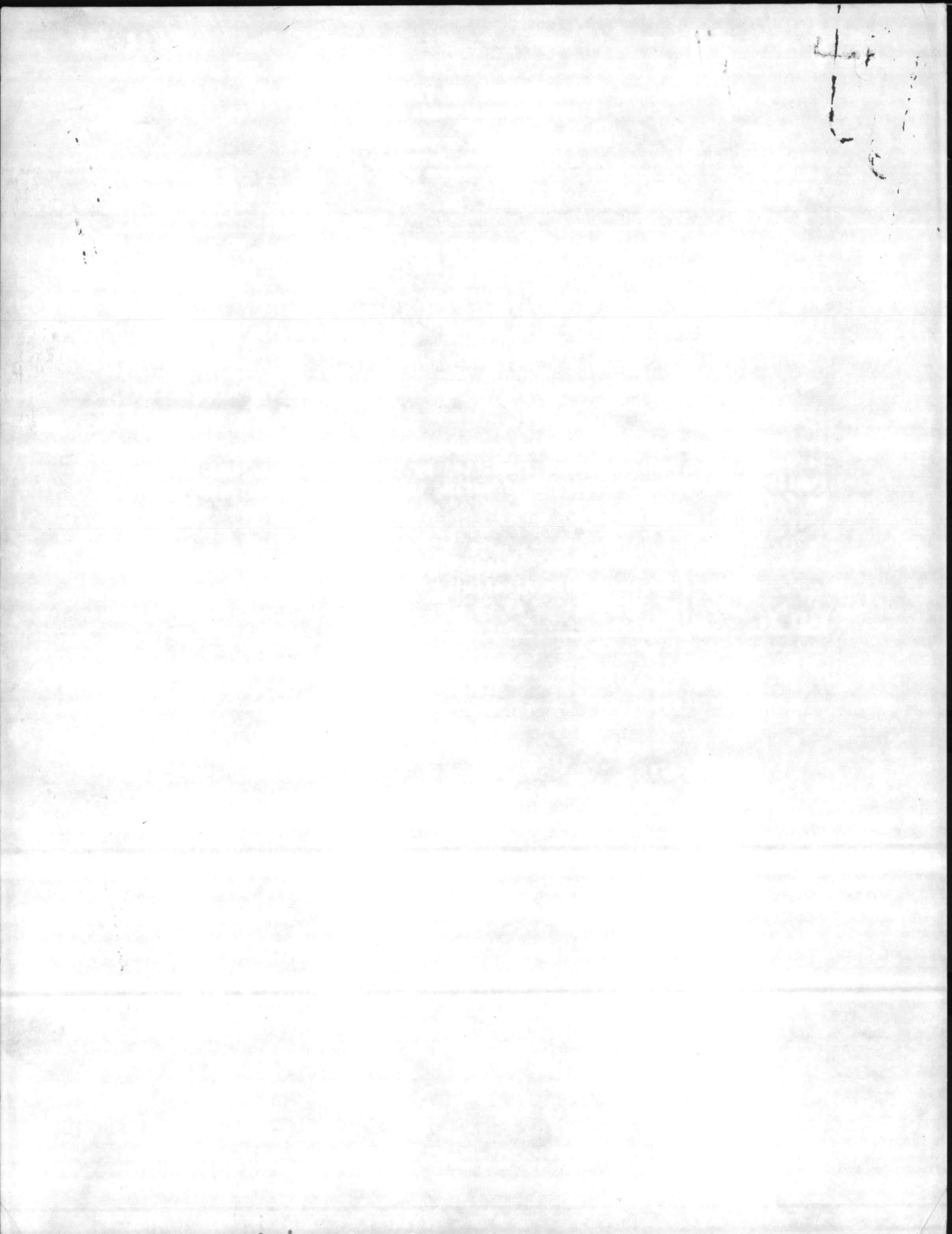
William R. Mark, Jr.

WILLIAM R. MARK, JR.
 By direction

8-17-72

#3 well

Chloride - 250.0 PPM.



DEPARTMENT OF THE NAVY

RESIDENT OFFICER IN CHARGE

NAVAL FACILITIES ENGINEERING COMMAND CONTRACTS
CAMP LEJEUNE, NORTH CAROLINA 28542

IN REPLY REFER TO:
43-60:BLR:jj
N62470-73-C-1155
SEP 21 1977

From: Resident Officer in Charge of Construction, Jacksonville, North Carolina Area
To: Commander, Atlantic Division, Naval Facilities Engineering Command (Code 05)

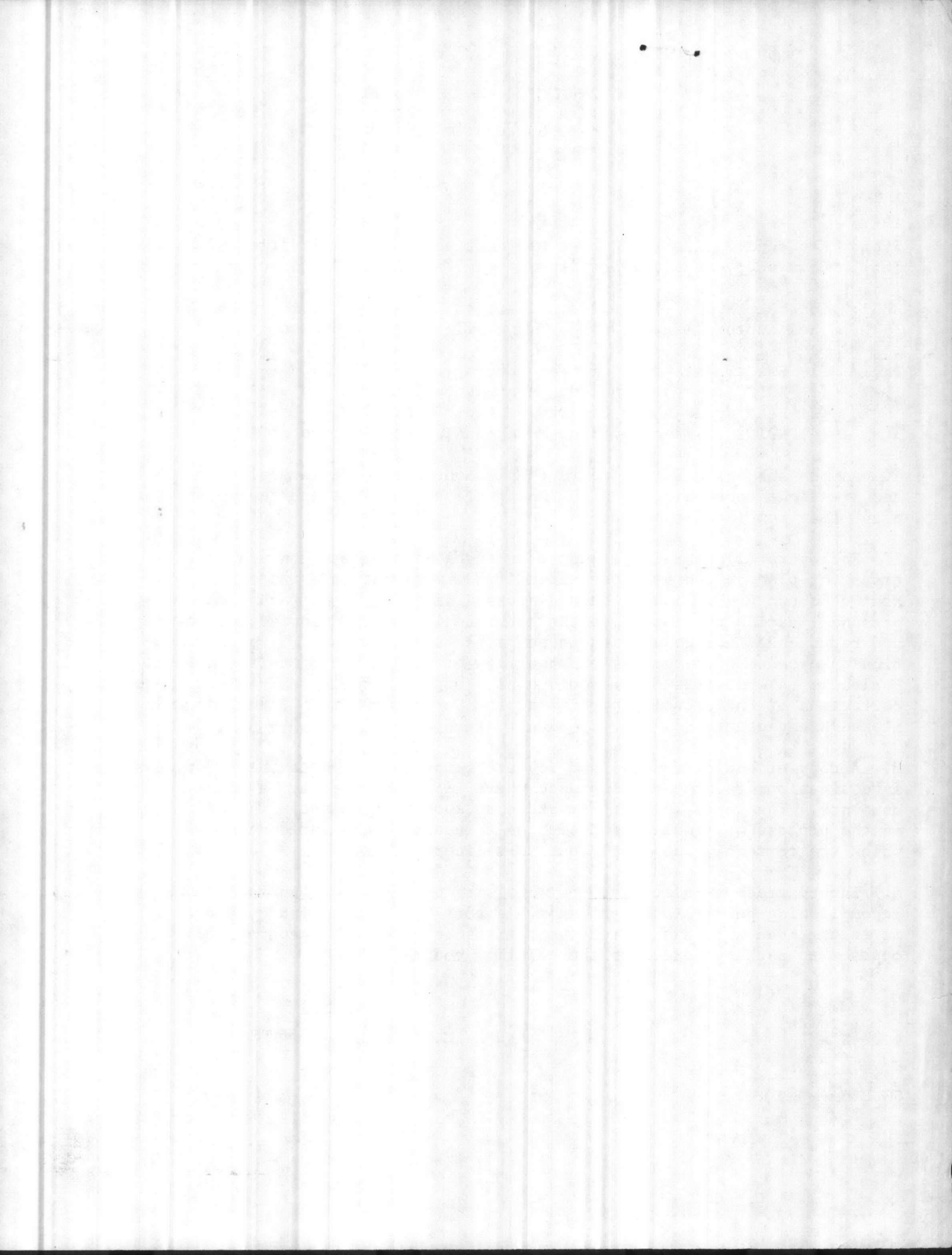
Subj: Contract N62470-73-C-1155, Utilities Expansion, Marine Corps Air Station
(Helicopter), New River, Jacksonville, North Carolina

Encl: (1) Base Maintenance Officer memo of 24 Aug 77
(2) ROICC comments on Base Maintenance Officer memo of 24 Aug 77
(3) Base Maintenance Officer memo of 31 Aug 77
(4) ROICC comments on Base Maintenance Officer memo of 31 Aug 77

1. As the subject contract nears completion, there are several discrepancies and questions concerning both the water treatment plant and sewage treatment plant that remain unresolved.
2. Enclosure (1) contains a list of unresolved problems concerning the water treatment plant which have been identified by operating maintenance personnel. Most of these problems have been discussed between the A&E and such operating personnel during the course of the job. Enclosure (2) provides discussion and recommendations concerning these problems. Enclosure (3) presents a continuing problem with the sewage treatment plant portion of this contract. Enclosure (4) provides further discussion of this problem. The ROICC recommends correction of the capacity problem at the Sewage Treatment Plant and all items on enclosures (1) and (2) except items d, l, n and part of item e.
3. A copy of enclosures (1) and (3) are being forwarded to the A&E requesting investigation, recommendations, and where A&E liability may be involved, comments. The reply will be forwarded as soon as received. The A&E is also in the process of finalizing design on a repair to the surge and which are currently inoperable due to a liner failure.
4. The contractor has closed down his site office and organization and is accomplishing punch list items from his home office in Orlando, Florida. It is recommended that any corrective actions be handled by separate contract as opposed to a change order on the existing contract.

C. A. TACK

Copy to:
CG (Attn: BMO)



10
20
60
520
510

05/10/75
WJ

BASE MAINTENANCE DEPARTMENT
Marine Corps Base
Camp Lejeune, North Carolina 28542

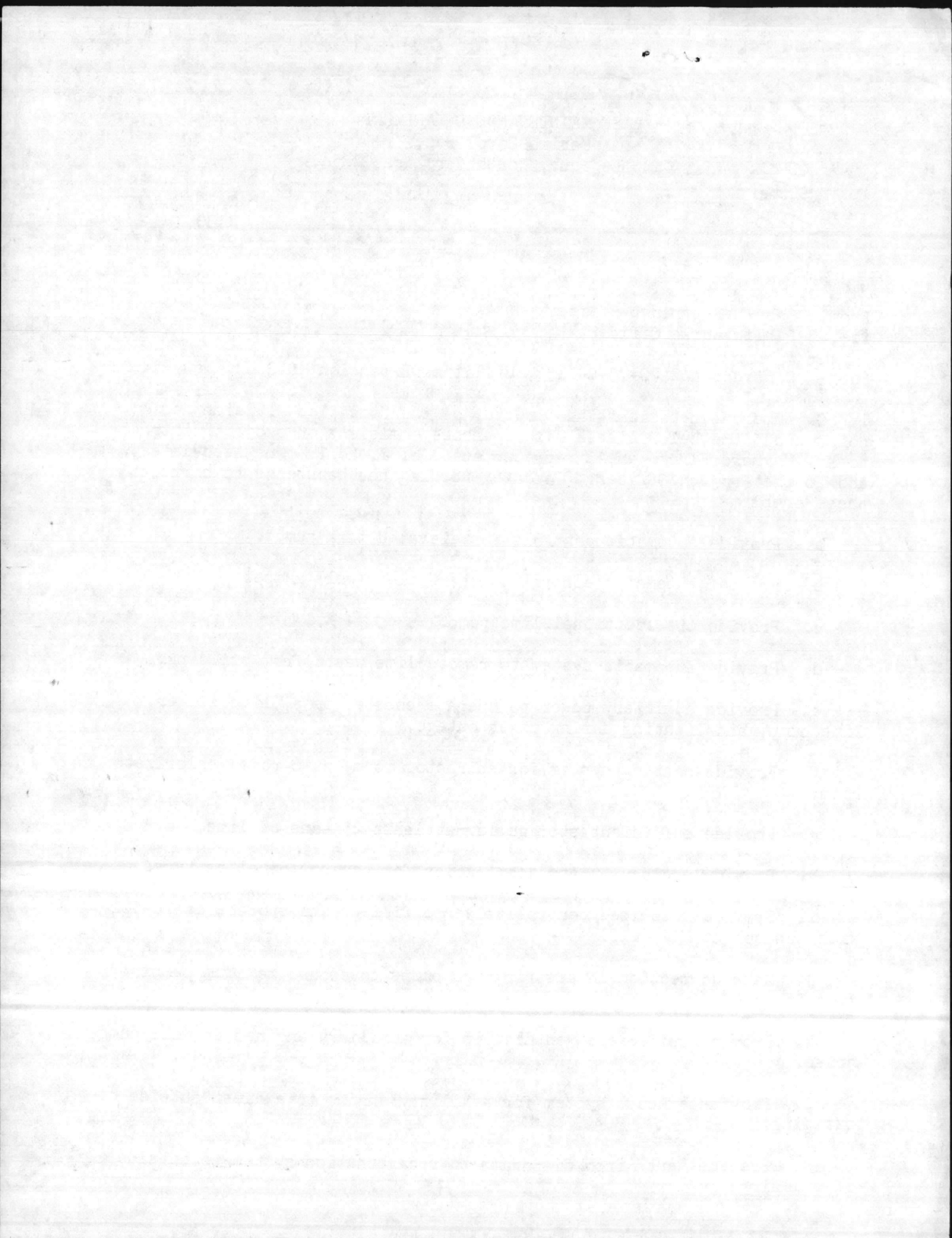
MAIN/BRW/rn
11330
24 Aug 1977

From: Base Maintenance Officer
To: Public Works Officer

Subj: Contract N62470-73-C-1155, Utilities Expansion MCAS(H), New River

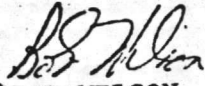
1. On numerous occasions the Director of the Utilities Division has pointed out the below listed discrepancies/ommissions on subject contract to Mr. Maynard Elrod, an AE representative of J. K. Timmons Associates, and to the Project Officer. To date, nothing has been done to correct these problems:

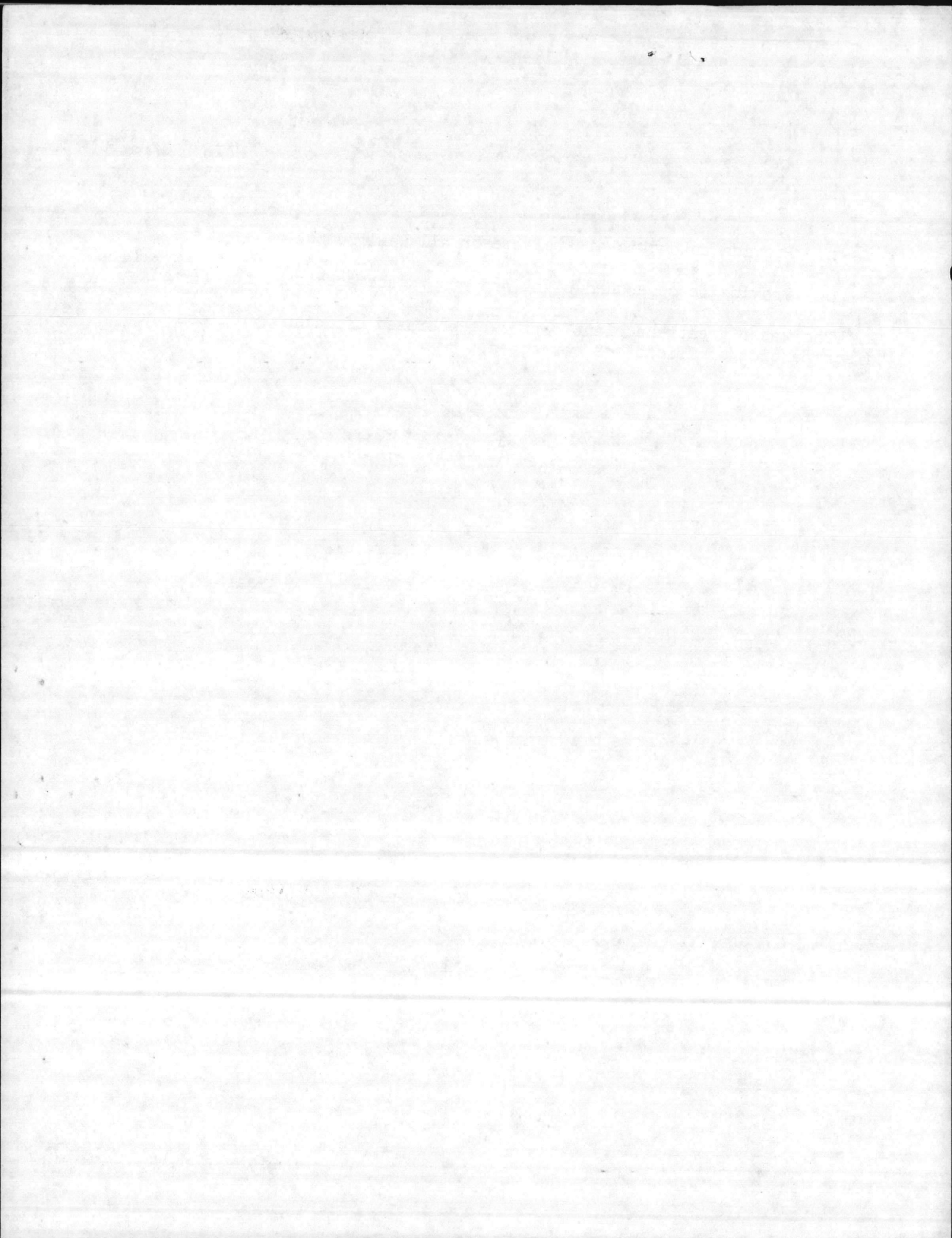
- a. Provide automatic controls for elevated tank pumps.
- b. Provide automatic control to start clear well pumps.
- c. Provide one additional lime pump.
- d. Provide automatic system to remove lime waste from building.
- e. Provide auxiliary power to operate booster pump, lime slaker, lime pump, and lighting during power outage.
- f. Provide heating system for spiractor room, pump room, chlorinator room.
- g. Provide sufficient storage for at least 25 tons of lime.
- h. Provide enclosures and ventilation for control panel battery.
- i. Provide motorized control valve to fill ground storage at TC-501 with control at MCAS-110.
- j. Make correction in distribution pumps to assure maximum pumping capacity.
- k. Provide sufficient ventilation for auxiliary engines in well pump house.
- l. Provide exhaust system for auxiliary engine to exhaust outside of building.
- m. Provide vents from diaphragms to recarbonation system to outside of building.



MAIN/BRW/rn
11330
24 Aug 1977

- n. Provide automatic air release on all well pumps.
 - o. Provide fence around plant and ground storage tanks for security.
2. The water treatment plant cannot be operated efficiently unless the discrepancies/ommissions are corrected.


BOB WILSON
By direction



ROICC COMMENTS ON BASE MAINTENANCE OFFICER MEMORANDUM OF
24 AUGUST 1977

a. The A&E has verbally indicated that the existing manual system can be made automatic for an estimated cost of \$1,000. Recommend this action be taken.

b. The clear well pumps presently have an automatic cut-off. The A&E has verbally estimated this job at \$500. Recommend this control be provided.

c. One additional motor (uninstalled) was provided under the contract, but there is no back-up pumping system. Repairs/maintenance to the motor necessitates the entire system being out of service. This appears to be the result of a design omission. Recommend correction of this problem.

d. The present removal system is a wheelbarrow, which must be emptied one or two times per day. This problem stems partially from the quality of the lime supplied, with recent improvement noted due to a supplier change. The present manual system does not appear to be a major problem in the daily operation of the plant. Recommend no action on this item.

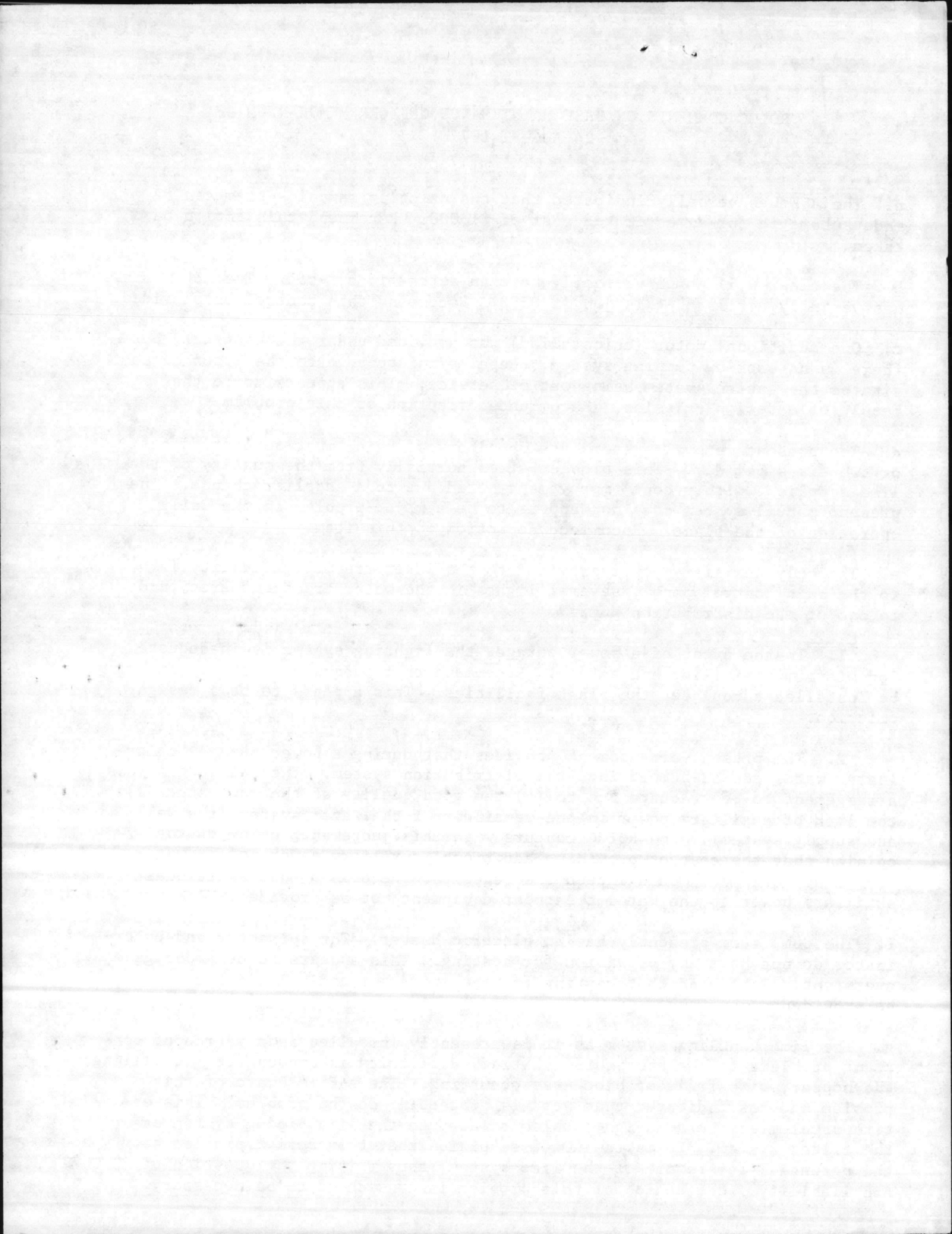
e. The only auxiliary power provided to the water treatment facility is to the main control panel, several lights in the water treatment area, and to one of the distribution pumps.

1. In the event of a power outage, the lighting system is inadequate for minimum visibility and safety. Recommend that adequate emergency lighting be installed throughout the plant facilities. This appears to be a design omission.

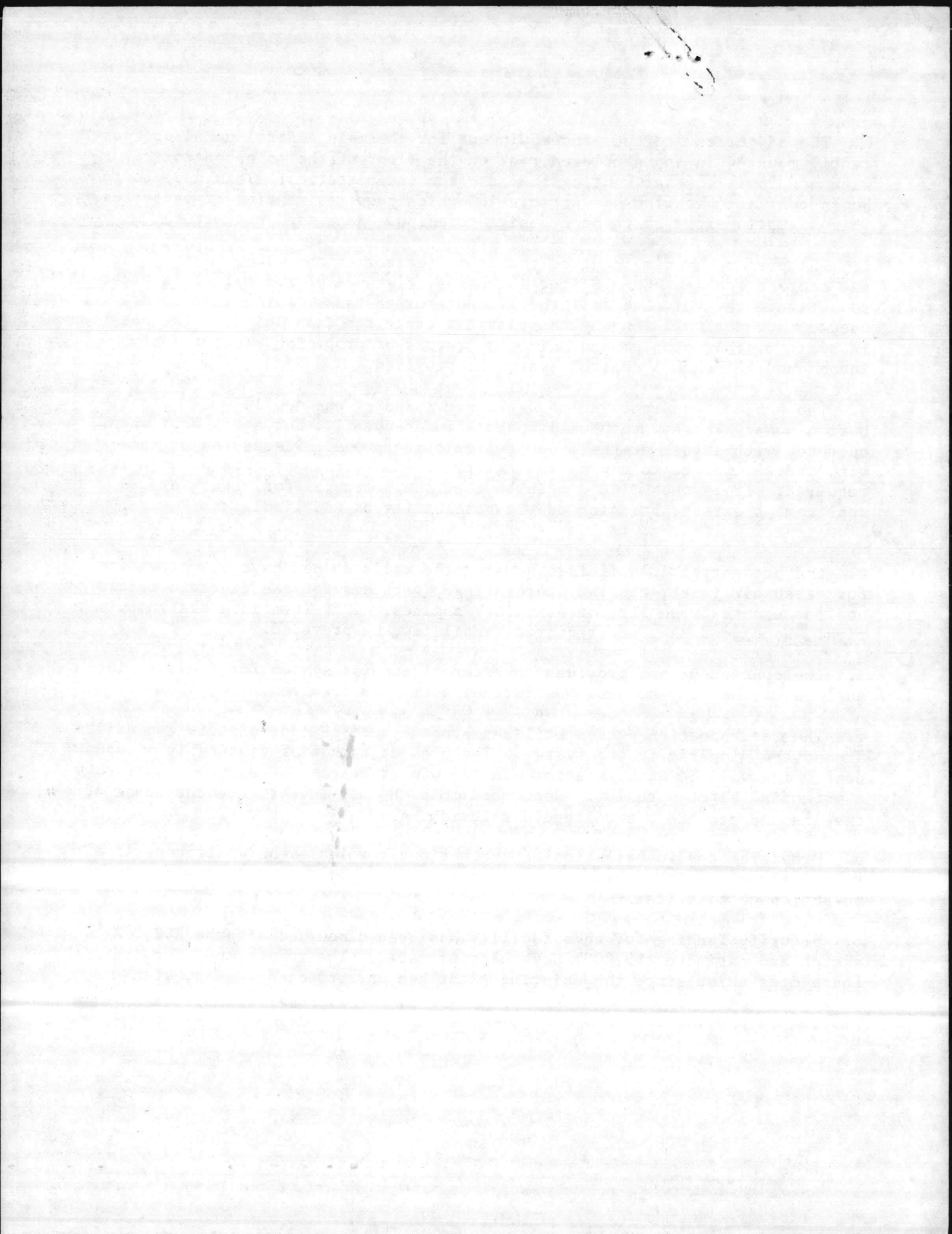
2. The present arrangement provides that during a power outage chlorinated water can be pumped into the distribution system. The A&E judges this arrangement to be adequate due to (a) the good quality of the raw water (b) the lack of auxiliary power in the remainder of the water system (the wells and supply system). The ROICC concurs with this judgement, being of the opinion that the cost of providing additional auxiliary power to the water treatment equipment would exceed the benefits. Recommend that additional auxiliary power to the water treatment equipment not be provided.

f. The pump room presently has an electric heater. The spiractor and chlorinator do not have any provision for heating. This appears to be a design oversight. Recommend that heating for the spiractor and chlorinator room be provided.

g. The lime handling system as it is presently installed is a source of constant problems to the operators. Extreme difficulty is encountered in filling the hopper, with frequent blockages occurring. The A&E is aware of this problem and has indicated that work is proceeding on the problem. This entire problem may be a design problem related to the lime piping system or the filter system. It is the ROICC's opinion that this design problem has the potential for rework of the lime system, thus raising the question of A&E liability. Correction of this problem is considered to be necessary.



- h. The batteries and charging equipment for the main control panel are currently mounted in an unenclosed rack on the floor of the main control room with no provisions for venting the gas from the batteries. This appears to be in conflict with the NEC Article 480 which requires venting of batteries. This situation appears to be a design omission. Recommend correction.
- i. The present system requires that the operator at the water plant go to the storage tanks at Camp Geiger (a one-way distance of 1.5 miles) in order to activate the valve to fill the ground storage tanks, which in turn are used to automatically supply the elevated tanks for Camp Geiger. The A&E is aware of this problem and is in the process of proposing a solution. Recommend that such a control system be provided.
- j. The subject contract included the provision of one new 1000 GPM distribution pump. The new pump will operate independently, but shuts down when operated with either of the other two existing pumps. Discussion of this with the A&E points to a pump sizing error. Correction of this problem is required. It is the ROICC's opinion that the potential for rework or pump replacement exists, bringing up the possibility of A&E liability.
- k. The prefabricated buildings housing the wells do not have any provision for fresh air inlet, causing overheating Problems for the electric motors and inadequate fresh air for auxiliary engines. This item is a design omission. Recommend that the required ventilation be provided.
- l. The contractor has provided an external exhaust system for the auxiliary engines at the pump houses. No further action is required.
- m. The recarbonation system utilizes propane, and an odor of this gas exists around the diaphragm in the system. The present method of venting is an open door which will be unsatisfactory in the winter months. The problem presents a potential safety problem. Recommend that the A&E investigate the cause of the gas and provide a recommended solution.
- n. Provision and installation of automatic air releases on well pumps is a relatively minor item which could be accomplished by the user. Recommend no action on this item.
- o. Security fencing for this facility has been discussed with the A&E. A sketch and estimate (\$3,000) have been prepared. The requirement for the fence does exist since the existing plant has unrestricted access, with occasional periods of nonattendance by operator personnel. Recommend that fencing be provided.



UNITED STATES GOVERNMENT


Memorandum

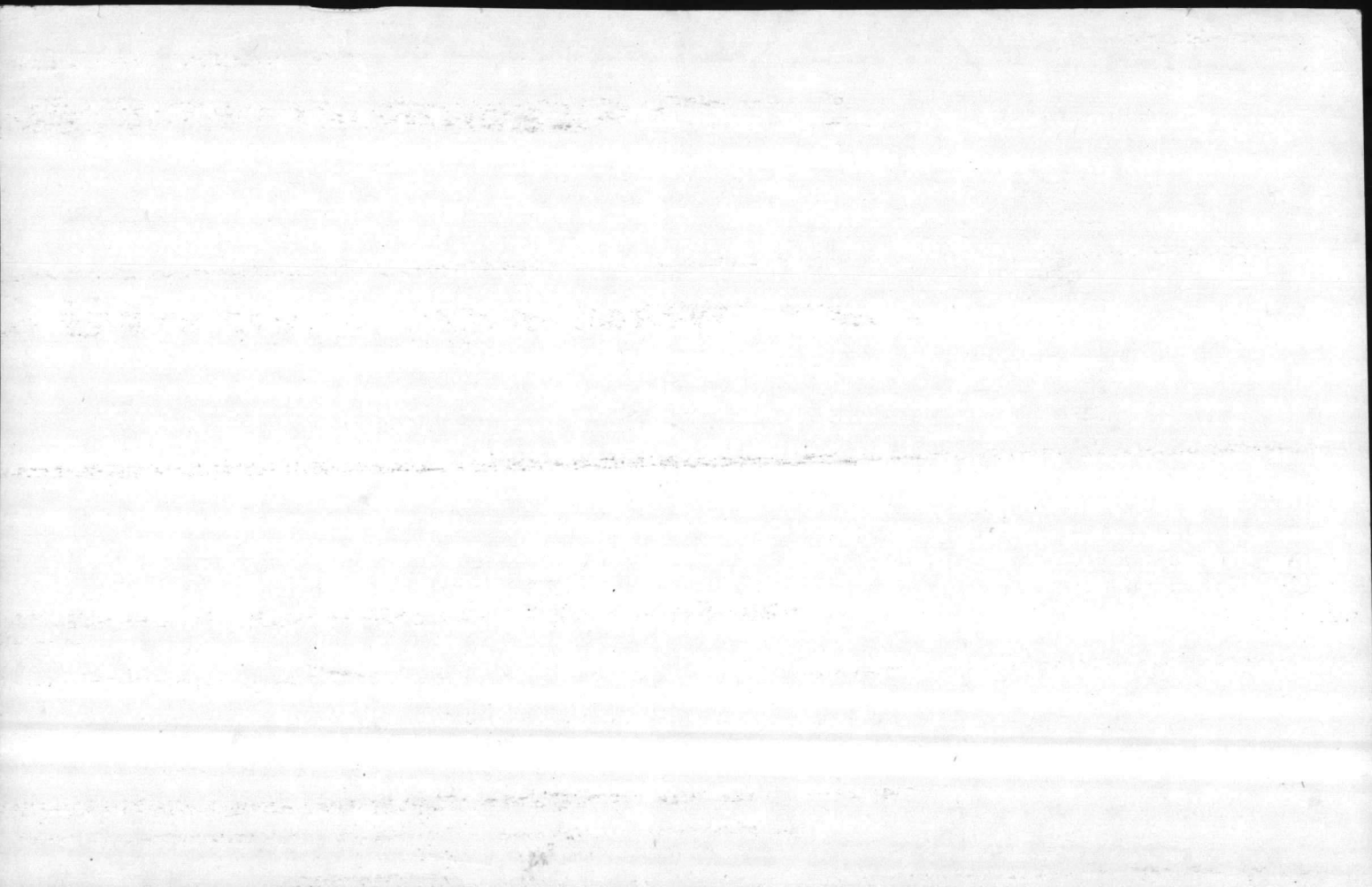
TO : LTJG R. H. DEVRIES, Public Works Officer, DATE: 11 January 1966
Marine Corps Air Facility, New River

FROM : ENS J. W. DODSON, Assistant Resident Officer in
Charge of Construction

SUBJECT: Contract NBy-54096, Operations Building and Combat Equipment
Maintenance Shop, Marine Corps Air Facility, New River,
Jacksonville, North Carolina

1. The laboratory report on the chemical analysis of the water sample taken from the well at the MACS Facility is attached for your information and use in arriving at the needed treatment of the potable water.


J. W. DODSON



MI/M50

ENGINEERING SERVICE REQUEST NO. 72-11-10-19Y3AB07
STUDY FOR REDUCTION OF EXCESS ALKALINITY
IN DOMESTIC WATER SYSTEM
AT THE MARINE CORPS AIR STATION (HELICOPTER)
NEW RIVER, JACKSONVILLE, NORTH CAROLINA

MAY 1973

UTILITIES DIVISION
ATLANTIC DIVISION, NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA

Prepared by:

C. R. Thompson
C. R. THOMPSON
Sanitary Engineer

MI / M20



ENGINEERING SERVICE REQUEST NO. 72-11-10-19Y3AB07
STUDY FOR REDUCTION OF EXCESS ALKALINITY
IN DOMESTIC WATER SYSTEM
AT THE MARINE CORPS AIR STATION (HELICOPTER)
NEW RIVER, JACKSONVILLE, NORTH CAROLINA

INTRODUCTION

As requested by your engineering service request of 14 January 1972 (LANTNAVFACENGCOM ESR No. 72-11-10-19Y3AB07), a study was made during the week of 27 November through 1 December 1972 pertaining to the reduction of excess alkalinity in the domestic water system.

PERSONNEL CONTACTED

The following personnel were contacted during the course of this study:

LTJG D. C. Jackson
Mr. E. L. Rouse

Assistant Public Works Officer
General Engineer

DISCUSSION

1. The raw water for the treatment plant is obtained from a series of deep wells. The water from the wells is mixed together and enters the treatment plant in one effluent line. The raw water first flows into a Graves reactivator where 600 pounds of lime and 100 pounds of alum are added per day. The Graves reactivator is rated at 980 GPM by the manufacturer but AWWA criteria recommends that the flow rate through a reactivator of that size should be between 622 GPM and 725 GPM.

The water flows from the reactivator to two pressure filters that are 8 feet in diameter and 25 feet long. Each filter is rated at 500 GPM by the manufacturer. The recommended rate by the A&E was 400 GPM. When the filters were operated at 400 GPM, channeling was a problem. At the time of the investigation, the filters were being operated at 375 GPM. A small amount of channeling was still taking place, and the plant operators planned to reduce the flow rate to 325 GPM in order to eliminate the channeling. The pressure filters are back-washed with treated water at a flow rate of 750 GPM for 20 to 30 minutes.

2. Analysis of the raw water is done at each well, but no analysis is done of the raw water mixture as it enters the treatment plant. The reasons for this are (1) no convenient sampling point and (2) the water quality will change depending on which wells are in service and the pumping rates of each.



During the investigation, a raw water sample was taken and analyzed.

RAW WATER QUALITY

Cl⁻ = 87.5 PPM
Fe⁺⁺ = 0 to .5 PPM
NO₃⁻ = .05 or less PPM
Hardness (soap method) = 130 PPM
Alkalinity P = 0 PPM
MO = 280 to 290 PPM as CaCO₃
Calcium Hardness = 150 PPM as CaCO₃
Total Hardness = 160 PPM as CaCO₃

An analysis of the treated water from the plant is given below:

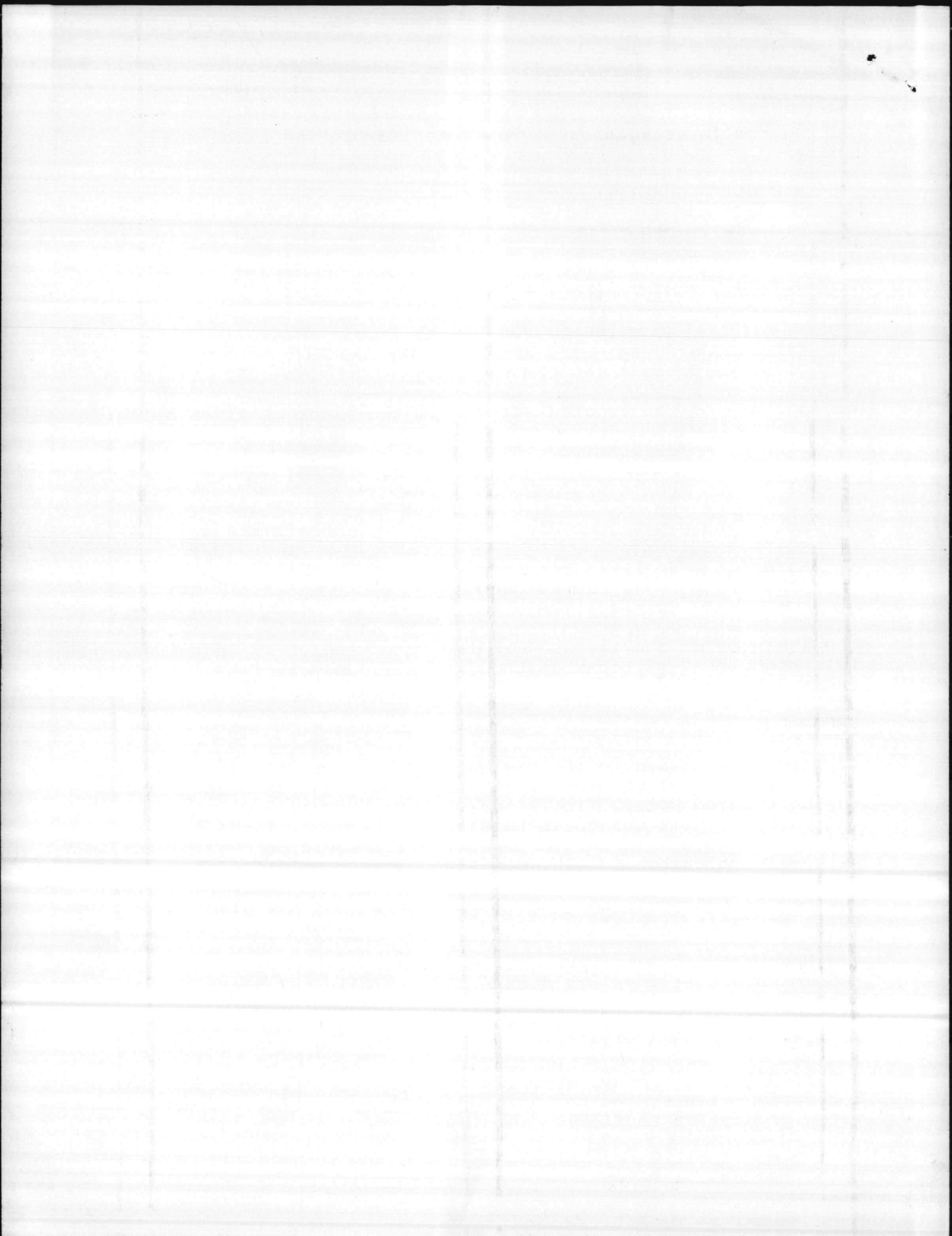
TREATED WATER QUALITY

Cl⁻ = 125 PPM
Fe⁺⁺ = .5 PPM
NO₃⁻ = .09 PPM
SO₄⁻⁻ = 55 PPM
Hardness = 66 PPM as CaCO₃
Alkalinity P = 8 PPM as CaCO₃
MO = 246 PPM as CaCO₃

The analysis of the raw and treated water indicates that there is a high level of bicarbonate alkalinity and calcium in the treated water.

RECOMMENDATIONS

1. The lime dosage to the raw water is not great enough because of the high level of bicarbonate alkalinity and calcium left in the treated water. It is not, however, recommended to increase the lime dosage at this time. Because of the inadequacy of the clarifier, the sand filters would be overloaded with calcium carbonate sludge. Also, more complete reaction with lime would raise the pH above the drinking water standards. Therefore, change is not recommended until the new plant is built and a recarbonation system for pH control is installed.
2. When the new water production facility is completed, it is recommended that the lime dosage be carefully calculated based upon an analysis of the raw water entering the plant. With a correct lime dosage, there should not be any problems from excess bicarbonate alkalinity or calcium in the treated water.
3. To decrease the hydroxyl alkalinity, it is recommended that a recarbonation system be included in the plans for the new water production facility.



EQUIPMENT REQUIRED AND COST

The recarbonation system should consist of a submerged combustion burner with pH control. It should be sized to handle the flow rate through the future water production facilities. A cost estimate for an Ozark-Mahoning Company recarbonation system of 1.3 MGD capacity is \$7,000 for burner unit and \$3,500 for pH control. This price estimate includes the services of an Ozark-Mahoning field engineer for three days to put the unit in service and train the operators.

LANTNAVFACENGCOM has contacted the A&E and it has been agreed that a recarbonation system is needed in the new water treatment facility. The A&E will include the recarbonation system in the design of the water treatment facility.

