Dept of Engineering
U.S. Naval Academy
Annapolis July 8th 1854

Commander
L.M. Goldsborough
Superintendent

Sir

I have Examined the points to which my attention has been called and respectfully

Report

1st As to the Means of supplying the Boilers with fresh water

2d As to the Cost of draining the Steam pipe & keeping it clear of water

3d As to completing the alterations necessary in the arrangements for retaining the Condensed Steam from the boilers & the Boilers

1st There are two Methods of supplying the boilers with water, one by a cistern, the other by a well. I must maintain my opinion that the best source from which to supply the boilers should be cisterns. We should have a cistern 60 feet by 12 by 15. But it must be built in a different manner from that in which our other hydraulic work has been performed, a Master Mason is needed accustomed to such work.

This cistern cannot be put up this winter a well that will answer our present purpose & be useful to the yard afterwards

should be our present resource. This well is proposed to be dug near the lower well in the yard. To test the fitness of this water for our use, I Evaporated 1000 grammes of water, the residuum was 0.19 of a gramme of this $\frac{2}{3}$ was pure silica & insoluble. It does not appear to me, that if we blow off often, this amount of sediment can do any immediate injury to the boiler.

2d As to draining the, Steam pipe box, of water,

The deposit on the boiler tubes undoubtedly came from this water. By the Analysis of Dr. H. Humphreys President of St Johns College it appears to be Mainly Mortar, lime & silica, taken up by the water as it percolated the loose, made, Earth, a part of which was the rubbish of old buildings: this accounts for the deposit forming on the tubes at as low a point of saturation as $\frac{1}{3}$ that of Sea water. I propose to keep this water clear of the Engine & have Estimates for a Centrifugal pump. The water to be brought to this pump by a Wind Mill from the spot where the water was formerly pumped by hand.

3d As to Completing the alterations necessary in the Steam apparatus for heating I propose to put 2½ & 1 inch pipe in place of half inch for return pipe in the buildings and two inch and one & a half inch for the receiving or Main dish pipe.

I am Sir
Very Respectfully
Your Obt Servt
W. Keyes Hopkins