

Uncontaminated Science Seawater Incubator Testing
USCGC Healy
Science Sea Trials, Phase IV, Leg 2

A preliminary test of the uncontaminated science seawater incubator was undertaken. This unit has several obvious problems that will require changes before and/or during the first scientific uses of the incubator system. This preliminary test is intended to document the present state of the incubator system and to offer some suggestions for changes that may meet some of the operational requirements. It should be noted that it is a rare ship that can fulfill all of the stated requirements. Normally the most important requirements are optimized. For instance, some zooplankton incubations do not require sunlight but must maintain surface seawater temperatures while others have a critical need for direct sunlight without shadows as well as the ambient seawater temperatures.

Incubator Requirements (in approximate rank order):

1. Full sunlight with no shadows from vessel structures
2. Cooling water at sea surface temperatures
3. Incubator drainage that does not present safety hazard
4. Direct access to incubator location from lower weather decks
5. Electrical power to operate lights and mixing devices
6. Clean air and water to minimize contamination of samples
 - A. Normal seawater system for temperature regulation only
 - B. Uncontaminated science seawater
7. Low vibration environment

Day 5 report (Thursday 8 June 2000)

Uncontaminated Science Seawater Incubator Status:

An incubator was not available for testing purposes, however several known deficiencies would make a total incubator test impractical and a waste of time. The major problem with the existing incubator system is the warm cooling water that is several degrees above ambient surface seawater temperatures. This is caused by using the fire control water source which has waste heat added to it. It was decided that a check of the flow rate and temperature of the existing system was needed and a quick check of the distribution manifold if possible. The hose connecting the fire main to the distribution valve could not be located so only flow rate and temperature measurements were collected from the main valve. It should be noted for the record that the only access to the incubator site requires passage through interior passageways. Carrying bottles of water through the interior is not advisable or practical.

Summary:

The flow rate test was conducted with a bucket and stopwatch with the valve fully open. Two gallons of water were collected in 3.6 sec at a temperature of 11.8 °C. This is roughly a flow rate of 33 gallons/minute and well below the test criteria of 50 GPM. The temperature of the uncontaminated scientific seawater was 1.86 °C for a differential of approximately 9.4 °C. The incubation area was not fully assessed with regard to sunlight because there are serious shadow problems with the nearby exhaust stacks. See the recommendations below for suggested alternatives. The gang distribution manifold could possibly be operational but it was not tested. The probable flow rate from the five manifold valves should be about 6 GPM from each valve.

It should be noted that piping for uncontaminated scientific seawater system does not extend to the 04 deck where the incubation system is located. Even if the piping were present there would not be enough pressure to reach the 04 level thus requiring the installation of a larger pump. The lack of access to the incubator site from the weather decks below is a big issue that cannot be satisfactorily remedied with cranes or hoists. Many of the incubations require multiple trips between the incubators and the scientific

laboratories for rapid processing of the samples. The present area is simply too far removed from the scientific laboratories to be useful. While an extensive search was not undertaken it was also noted that electrical power was not available nearby at the present location. Lastly, it was noted that there were considerable amounts of fumes from the exhaust stacks and the aft portion of the nearby stack was discolored by soot. Since several severe problems exist for this system in the present location, recommendations below will concentrate on other locations that offer more options.

Recommendations:

There is no ideal site that will fully satisfy incubation needs. There are some options near present outlets of the uncontaminated scientific seawater system on the weather decks. The most likely site is probably on the 02 deck at a van location on the port side not too far from the helicopter shed. The flow rates of the two spigots (6.4 and 6.1 GPM) from the uncontaminated seawater system at this site are quite good and the temperature was only about +0.49 °C above ambient over the range of -1.0 to +4 °C (See uncontaminated scientific sea water system report for details). Incubators near the rail would also enjoy mostly sunlight without shadows during hours of peak radiation input. Depending on other scientific programs there may be places on the main deck fantail that could be used although some shadows will be present at all locations. These locations offer uncontaminated science seawater for those incubations that require continuous flow feed water for chemostat or turbidostat phytoplankton growth experiments.
