

DATE: September 18, 2000

FROM: Matthew Hawkins, Director, Marine Operations

SUBJECT: UNOLS Standard Van Design Status Report - UNOLS Annual Meeting.

The following is a brief status report on the development of the UNOLS standard van design that has been recently undertaken.

Specifically, the goals in developing this standard design were:

- To ensure safe design and construction of portable laboratory vans used on UNOLS vessels.
- To standardize certain design elements to best meet the needs of the scientific community.
- To make portable vans no longer "ship specific", and thus usable throughout the UNOLS fleet.
- To reduce overall cost by facilitating bulk purchase.
- To ensure the ability to transport by common carrier as "containerized cargo".

### **Design and Bid Process:**

In 2000, six UNOLS operating institutions requested funds through Shipboard Scientific Support Equipment proposals to construct portable scientific vans for use on their vessels. To meet the long range goals listed above, development of a standardized UNOLS van design was encouraged by NSF.

To develop this standard van design, the six operating institutions that requested vans formed a working group, led by the University of Delaware. Input was solicited by consulting with individuals at each institution who were familiar with van design and the use of vans in scientific operations. The resulting first version of the design (including specifications and drawings) was completed in June 2000. A competitive bid package was assembled and sent to seven vendors, including one operating institution, to obtain initial quotes. Of the seven companies who were asked to bid on the project, four responded with detailed proposals and cost estimates.

### **Proposal Submission and Funding:**

The quotes obtained from the bid process above were used to develop a proposal to NSF to fund a total of five portable vans. The institutions planned to receive vans in this round of construction include: University of Washington, Woods Hole, Scripps, Oregon State University, and the University of Texas.

Funds for this project are currently in hand. The purchase and construction oversight will be administered by the University of Delaware for the benefit of the other operating institutions.

### **Regulatory Review:**

The bid process raised several important issues with regard to van construction that could not be resolved prior to the submission of the proposal. The most significant issue was the fire rating of the "box" itself. The vendors recommended that the vans be built to an "A" rating, which means that a standard 20-foot container cannot be used since the thickness of the steel is not adequate to meet this standard. This has a significant impact on both weight and cost.

There were significant questions as to the regulations the vendors were applying in making this determination. The University of Delaware's naval architect was consulted to independently review all appropriate regulations relating to van construction and design, both domestic and foreign.

The following are findings that have resulted from this investigation:

- 46 CFR 195.11 – "Portable Vans and Tanks" (Subchapter U) should take precedence since it is the only regulation which applies specifically to portable vans used on research vessels. These are general in nature and do not specifically address the remaining issues given below.

- 46 CFR 190.07-10(b) which states "boundary bulkheads of general laboratory areas, chemical store rooms, . . . shall be of "A" class construction" COULD be applied to portable vans. However, it is generally accepted that this regulation was intended for boundaries integral to the ship, and an "effective" A boundary may be appropriate for vans as described below.
- 46 CFR 194.15-"Chemical Laboratories and Scientific Laboratory" should be applied to portable vans as suggested by the RVOC Safety Standards. The required use of incombustible materials throughout is further justification for the exterior boundary of the vans to be completely non-combustible (as recommended below) in order to prevent the spread of fire.
- The van vendors may have mistakenly applied Passenger Carrying Vessel Rules to scientific portable vans which would require "A" rated construction on exterior bulkheads. Research Vessels are specifically separated from Passenger Vessels in the regulation, and application of such standards to scientific vans would undermine the intent of Subchapter U. The "effective" fire rating described below thus remains a viable option.
- Current standards used in the construction of accommodation vans used on oil drilling platforms in the Gulf suggest "A" construction. This should not be applied to research vessels. The location on R/V's is not hazardous, and (unlike oil drilling platforms) there is intervening ship's structure to control the spread of fire and protect personnel.
- Internationally, research vessels are generally considered cargo vessels. Contact with IMO regarding international standards for portable labs indicated that no regulations currently exist under the Code for Special Purpose Ships. We were advised to rely on USCG for their ruling on such matters.

### Remaining Issues:

- **Fire Rating:** Though the regulations may not address this issue adequately for our application of portable vans, the UNOLS community needs to decide what is **prudent** with regard to fire rating. The goal of structural fire protection is to control the spread of fire from one compartment to the next.

One path is to look at the "effective" fire rating of the van/ship structure system. Since vans are portable and exterior to the ship's structure the entire "sandwich" (sheathing-insulation-van bulkhead-air space-ship's deck/bulkhead) could be considered an "A" rated system. The ship's bulkheads and deck would supply the required plate thickness. However, this philosophy will necessitate the material recommendation given below.

- **Panel Stiffness:** There is some concern from both vendors and USCG about the panel stiffness on 20-foot containers, since they are intended for cargo rather than human occupancy. Calculations by the naval architect indicate that the corrugated sides of standard containers (14 gauge) DO NOT meet the strength requirements for deck houses under ABS <295 foot Steel Vessel Rules. They could pass if certain criteria in the rules are "interpreted" by disregarding the minima. Again, the question is should these rules (or any other) apply to vans.

Again, addition of stiffeners may be prudent. The only concern is that once stiffeners are added, the weight and labor costs may approach building the vans initially to the higher "A" rating.

- **Securing Options:** As part of the specification writing process, a DRAFT version of recommended securing options was developed. This should be finalized to provide guidance to operators in safe and accepted methods of securing.

### Recommendations

It is recommended that one class of van be designed that is appropriate for use on all UNOLS vessels. Though decisions will need to be made on the remaining issues above, the regulatory review indicates that this should be possible since international rules appear to have little impact. Thus, there should be no need for both a "Domestic" and "International" van as originally thought.

The desired path is to be able to use a standard 20-foot container when possible because of cost and weight advantages. However, several recommendations can be made at this point in time:

- Vans which are normally occupied by personnel (lab and berthing) should be constructed of non-flammable materials all around. Material may either be steel or aluminum.
- The side panels of vans which are normally occupied should be adequate to protect personnel from the hazards of the marine environment. An appropriate strength standard should be applied. Some additional stiffening above the usual corrugations MAY be required.

Please refer to the attached Table which is a DRAFT version of the recommended construction standards for the various types of vans used on UNOLS ships.

### **Final Review and Construction:**

The information provided here has very recently become available. The recommendations outlined still need to be submitted to the other marine superintendents for comment since the impact of standardization is far reaching. Once the major issues are resolved, the final version of the specifications and drawings will be assembled. This will involve one more round of discussion on the details of arrangement and construction to ensure that the design meets the needs of the various operators. It is hoped that this can be achieved by November, 2000 with the final bid package going out in December. Construction of the vans should begin in early 2001.

The final Specification developed in this process may eventually be used as guidance for institutions or scientists who wish to construct their own vans. Therefore, comment on arrangement and details will also be solicited from the scientific community to ensure that the final design is able to meet their needs as well. To that end, the specifications and drawings have been posted on the UNOLS home page. Input from the scientific community at large will be incorporated into the final design before the vans go to construction.

### **Final Comments:**

A formal submission should be made to the USCG to obtain approval of the final van design. This step will:

- Formalize the UNOLS design as a safe and effective standard.
- Minimize the effect of local USCG Marine Safety Office "bias" with regard to van inspection.
- Assist in the interchangeability of vans from ship to ship, allowing use on both Coast Guard inspected and uninspected vessels.

Formal submission will add additional time to the construction time line. Unfortunately, there is no guarantee that the fire rating and bulkhead stiffness philosophy given above will be accepted.

Adoption of the recommendations given above is an incremental step forward with regard to standardization and safety. Retrofitting or up-grading existing vans in the UNOLS fleet to this standard could be costly for either the institutions, individual scientists, or the funding agencies. "Grandfathering" existing vans should be considered since this level of standardization was not available when they were originally constructed. If adopted, all future vans should be built to this new standard.