From: GDV%"pdoe%weaks@LANL.GOV" 7-FEB-1990 15:54:53.91
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From: pdoe%weaks@LANL.GOV (Peter Doe)
Message-Id: <9002072047.AA15488@weaks.ARPA>
To: sno@mips2.phy.queensu.ca
Subject: Acrylic Minutes.

SNO-STR-90-23

Minutes of Discussion on Acrylic Vessel

Los Alamos National Laboratory, January, 11, 1990

(Minutes recorded by S. Buhler)

Present: G.Ewan, T.Bowles, B.Frati, J.Barton, T.Clifford, P.Doe, P.Jagam, N.Jelley, D.Knapp, H.Lee, K.Lesko, H.-B.Mak J.R.Leslie, S.Lundgren, A.McDonald, K.McFarlane, G.Milton, D.Hepburn, D.Paterson, B.Robertson, H.Robertson, D.Sinclair, P.Skensved, B.Stevenson, B.Sur, N.Tanner, R.Van Berg, D.Vieira, C.Waltham, D.Wark, J.Wilhelmy, J.Wilkerson, J.Wouters, M.Fowler, K.McFarlane, S.Elliot, S.Buhler, W.Davidson, D.Earle, D.Hallman

Guests: N. Munshi, J. Stachiw

The session began at 13:40.

Peter Doe started by introducing Naseem Munshi (a materials expert, formerly from LBL, now president of Composite Technologies, Boulder, CO) and Jerry Stachiw (US Navy + Stachiw Assoc., an expert on acrylic submersibles) to the collaboration. They have agreed to work as consultants for questions regarding the acrylic vessel.

The purpose of the session was to update the collaboration on the status of the acrylic vessel and the critical path items related to it. Peter Doe tabled a time chart which showed that by late March, 1991, the R&D for the acrylic vessel and the final design will have been completed. After that the procurement of the acrylic starts. He defined as a critical item the administration and management structure of the project with a need to identify responsible institutes, outline the interaction of components, identify a coordinator for the total

system. Recommendations of the Temple review committee need to be incorporated and a 90% (?) review of the design needs to be done in October, 1990, to satisfy AECL.

Art McDonald pointed out that we need to identify a team to satisfy our critical path requirements for the acrylic vessel, with a definition of the R&D efforts and the resources needed. Peter Doe reminded the collaboration that a program of work has already been outlined in workpackages 35000R1-5. Also, items that can be purchased or done with NRC money before March 31 should be identified. In general, costs are covered by DOE (for R&D) and Canadian agencies (capital equipment).

Then Davis Earle reported the latest results on the radioactivity measurements in acrylic. The results are inconsistent with what had been measured previously. Davis explained the measurement details, then pointed out that until September 1989 the best results showed 1 pg/g Th and U, but, since September the mass spectrometry results have become uncertian primarily because of concerns over the efficiency of rinsing the Th from the Suprasil tubes. The use of aqua regia and HF in addition to HNO3 may solve the problem. The early 1pg/g results may be 2 or 3 pg/g. amples of thermoformed acrylic from both Rohm and Polycast contain 2 to 110 ppt Th and 8 to 68 ppt Th respectively. Mass spectrometer measurements of Th agree within a factor of 2 between CRNL and NRC. Problematic is that Th is still traceable after 2 rinses which indicates a contaminated tube. Acrylic studies with neutron activation and gamma counting techniques have also a wide apread of Th concentrations. Four CY/RO and four Polycast samples have values from 3 to 200 ppt Th and 4 to 80 ppt U. The two best Polycast samples had Th/U at 3/12 ppt and 20/4 ppt. It cannot be excluded that some of these samples were contaminated in handling.

Davis pointed out that LBL may have a cleaner detector for the measurements. The summary tables for CY/RO and Polycast acrylic samples were:

CY/RO	Th	5	13	16	143		pg/g
	U	21	32	15	60		pg/g
Poly	Th	48	20	3	34	174	pg/g
	U	8	4	12	19	80	pg/g

Background for the Ge counters at 300 keV show that the Guelph counter seems to be the most quiet one. The question was raised whether the Compton suppression was sufficient for the samples of acrylic and whether we need a well-type Ge detector for the chemically separated samples after neutron activation.

The alpha counting results were consistent with the mass spectrometer results and Miltons results were tabled. Four Polycast samples showed Th between 2 and 5 ppt. A Rohm sample at 1 ppt and a CY/RO sample at 7 ppt. If there is a problem with inhomogenity in the acrylic it will be averaged out better in the alpha counting results because 10 to 15 Kgm samples were used here rather than 1 Kgm for the mass spec. and 30 gm for the neutron activation.

Dagam reminded us of the fact that the Guelph measurements of acrylic had always shown about 45+-20 pg/g Th.

The acrylic radioactivity was identified as an extremely urgent and critical item

Peter Doe continued with the overview over the mechanical properties research program, reiterating the Temple observations and recommendations. Most of the points raised by the Yemple committee are in hand and covered by the R&D workpackages, except the following; the acrylic should only be bought after the "final" review by AECL had passed and that more time was needed after the initial installation of the vessel in the mine to test and correct any problems that were found. The discussion showed that we need more "float" on the time chart for the dry test assembly of the vessel and that we need to specify the installation procedure in more detail.

Jerry Stachiw pointed out that the PVHO criteria do not apply for our vessel (we use it largely to specify material properties when buying the acrylic) and that the QA on the bond joints is a very critical item. At Stachiw suggestion a program to look at bond strenght vs. bond thickness has been added to the R&D program and will be undertaken by LANL.

An R&D program has been set up with regard to the material selection, the fabrication of bonds, the flexural and tensile stress measurements and the accelerated aging. R&D needs to be done also on procedural questions, machining and radioactivity, and acrylic tubing. This R&D is described in the 35000R work package, however, to carry this out in the required timescale, additional personell are required. This critical item can be resolved by identifying a Canadian Institute which will become involved in the acrylic vessel.

For the engineering design, Peter pointed out that we need to have a management structure in place first. The engineering specs for the acrylic vessel and its support need to be drawn up, before bids are requested and reviewed. Stachiw has agreed to carry out this task. Ken McFarlane identified the need for a formal "Design Plan" which describes in general terms the acrylic program. It was agreed to contact Steve Girrens at LANL to see if his division could be contracted to produce a "preliminary" design plan. This, and the engineering specs. would be made avaliable to the Project Management team in order to bring them up to speed quickly.

The session ended at 15:15.