BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: Thursday, March 12, 1998

TO: AGS/RHIC Radiation Safety Committee

FROM: E. Lessard

SUBJECT: RSC Review of Proposed Modification of A Target


Facts Presented

1. The prior A target was made of copper and had a copper base. The target and base were machined in one piece.
2. The corrosion was so serious for the copper A target that it was difficult to remove it from the holder. Green flakes and slimes present a dispersible radiation hazard whenever the corroded target is moved.
3. John Weeks of DAT studied the target and concluded the green coating was a copper sulfite or sulfate. Sulfur likely came from the ambient atmosphere. The presence of chlorine would enhance the formation of copper-sulfur compounds. E. Lessard determined that radioactive chlorine emanates from the target.
4. Due to interaction length and multiple scattering requirements, a copper target is preferred over platinum. Platinum causes multiple scattering which results in a higher dose to downstream magnets. It is high with copper as well but platinum is worse.
5. Solid nickel was considered since it would not form sulfur compounds; however, it has less thermal conductivity relative to copper and is magnetic. The magnetic field changes resulting from a nickel target cause the secondary beam to be asymmetric and unacceptable to the downstream collimator. Some less magnetic nickel compounds were considered but they have less thermal conductivity.
6. A nickel plated base will be used to help ensure the base can be removed from the holder. Nickel plating the target itself was rejected since it had been tried by J. W. Glenn in the past and tended to peel due to differences in thermal expansion between the two metals. Etching or oxidizing the surface of the target to make the surface atoms unavailable for sulfur interactions was suggested.
7. One thermo-couple is planned for the target. It will be located on-third the way along the length of the copper target.
8. Water flow will be interlocked on the return side.
Radiation Safety Check-Off List Items

1. Following installation, photograph the target. Repeat at two points, once in August and once during a maintenance day midway between the start-up and August. (A. Pendzick)
2. Prior to the four month run beginning in September, the liaison physicist shall sit with an RSC sub-committee and evaluate the status of the A target. (D. Lazarus)
3. Have a backup A target available. (A. Pendzick)
4. Certify the maximum A target intensity using a CME certification as indicated in AGS OPM 9.2.3, “Procedure For Chief Engineers to Certify Conformance of Devices.” (J. Tuozzolo)
5. Interlock the water flow returning to the target. (D. Phillips)
6. Install one thermo-couple and document temperature data for the RSC sub-committee meeting in August. (D. Phillips)

AGS / RHIC Radiation Safety Committee:

Ahrens, L.
Beavis, D.
Glenn, J. W.
Mac Kay, W.
Musolino, S.
Reece, K.
Stevens, A.
Thern, R.

Copy to:

Lazarus, D.
Lowenstein, D.
Pai, C.
Pendzick, A.
Phillips, D.
Pile, P.
Tuozzolo, J.