

Review of Two NIOSH Response Papers

Robert Anigstein and John Mauro, SC&A

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REVIEW OF FIRST NIOSH RESPONSE PAPER

Finding 5: Combined Exposures to ^{226}Ra and Betatron Operations During 1952–1962

- **NIOSH Response:**

- Time between exposures even longer than for betatron because layout man speeded up betatron radiography—radium radiography had to be a full-time assignment

- **SC&A Reply:**

- Layout man only marked up exposed castings—did not assist with initial exposure
- Initial shots set up by betatron operator and helper
- Betatron beam directional—required careful aiming and repositioning between shots
- ^{226}Ra radiation omnidirectional—needed 12–15 s to take source from lead pig and place it in position
- Former radium radiographer: Sometimes there was one person per shift (in the beginning), later increased to two or three per shift, since it made the work go faster and they got more shots
- 70% of time in betatron building a bounding estimate

REVIEW OF SECOND NIOSH RESPONSE PAPER

Finding 6: Beta Skin Dose to Layout Man Significantly Lower than Those Calculated by SC&A

- **NIOSH Response:**

- SC&A calculation of beta doses from irradiated steel different than calculation of photon doses
- Assumed 15-h continuous prior irradiation of steel not realistic
- Layout man receiving new casting every 75 min not realistic

- **SC&A Reply:**

- Photon exposures based on scenario described by former GSI employee, who later called it a rare occurrence
 - Used as an example, not a limiting case
 - Doses small compared to direct exposure to betatron beam—did not further refine scenario
- Betatron operators did not agree on single layout man scenario—SC&A used bounding scenario
- Beta skin doses to layout man—1.89 rads/y to hands and forearms, 1.14 rads/y to rest of body—minor compared to 9 R/y from direct exposure to the betatron beam
- NIOSH beta skin dose analysis based on scenario later discredited by GSI site experts
- NIOSH scenario unrealistic
 - Same casting shuttled continuously between the betatron and the layout man
 - Inconsistent with the purpose of radiography: finding and repairing flaws