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Frequency and Quality of Radiation Monitoring of Construction Workers at Two Gaseous Diffusion Plants

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ABSTRACT: Construction workers were and are considered temporary workers at many construction sites. Since World War II, large numbers of construction workers were employed at U.S. Department of Energy nuclear weapons sites for periods ranging from a few days to over 30 years. These workers performed tasks during new construction and maintenance, repair, renovation, and demolition of existing facilities. Such tasks may involve emergency situations, and may entail opportunities for significant radiation exposures. This paper provides data from interviews with more than 750 construction workers at two gaseous diffusion plants (GDPs) at Paducah, Kentucky, and Portsmouth, Ohio regarding radiation monitoring practices. The aim was to determine the extent to which workers believed they were monitored during tasks involving potential radiation exposures. The adequacy of monitoring practices is important for two reasons: (a) Protecting workers from exposures: Construction workers were employed by sub-contractors, and may frequently be excluded from safety and health programs provided to permanent employees; and (b) Supporting claims for compensation: The Energy Employees Occupational Illness Compensation Program Act (EEOICPA) requires dose reconstruction of radiation exposures for most workers who file a claim regarding cancer. The use of monitoring data for radiation to qualify a worker means that there should be valid and complete monitoring during the work time at the various nuclear plants or workers may be unfairly denied compensation. The worker interviews from Paducah and Portsmouth were considered especially useful because these sites were designated as Special Exposure Cohorts (SECs) and the workers did not have to have a dose reconstruction to qualify for compensation for most cancers. Therefore, their responses were less likely to be affected by compensation concerns. Interview questions included asking for

information regarding whether monitoring was performed, how often, and the maintenance (calibration) of monitoring equipment (devices).

KEYWORDS: radiation; construction; workers; gaseous diffusion plant

INTRODUCTION

A pilot medical screening program at the Oak Ridge Reservation for former construction workers was started in 1996 by a Consortium consisting of the University of Cincinnati Medical Center (UC), the Center to Protect Workers' Rights (CPWR), and Duke University Medical Center (DU) and was supported by the U.S. Department of Energy (DOE). This program was one of a series funded by the DOE, including referred to as the former workers program (FWP), to determine if workers employed in atomic weapons facilities were at "significant" risk for work-related illnesses. The Oak Ridge Reservation plant sites covered by the Oak Ridge Building Trades Medical Screening Program included X-10 (renamed as the Oak Ridge National Laboratory or ORNL), Y-12, and K-25, a Gaseous Diffusion Plant (GDP). In 2004, this program expanded to include medical screening for construction workers at two other GDPs that were historically administered by Oak Ridge Operations: the Portsmouth GDP in Ohio and the Paducah GDP in Kentucky.

In 2000, the Energy Employees Occupational Illness Compensation Program Act (EEOICPA) was enacted, and under Subpart B, workers can apply to receive compensation for cancers associated with radiation exposure. Workers employed at Amchitka Island and the three GDPs were designated by the Congress as Special Exposure Cohorts (SECs), which means that they are not subject to a dose reconstruction to determine total radiation doses received on the job before being eligible to receive compensation for 24 different types of specified cancers strongly associated with radiation exposure. This decision to create SECs was based on the information that the Congress had when the legislation was passed that radiation dose measurements were inadequate and/or not valid at these sites so that it would not be possible to provide an accurate and fair dose reconstruction for workers.

Ascertainment of cancer risk with retrospective radiation dose reconstruction is based on the assumption that there are accurate and valid records for each worker of his/her exposures over the years they worked at the DOE nuclear weapons production or research sites. Conversely, the SECs are based on the premise that exposure records are not available or accurate. There is a provision in the law that allows additional SECs to be added if a petition challenging the validity of existing radiation dose records is approved.

During the first phases of the Building Trades Medical Screening Program at the Oak Ridge Reservation, we noticed that responses to questions regarding radiation exposures were of concern. Verbal reports indicated that many construction workers were not monitored for radiation. Based on the need for

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TABLE 1. Demographics of Participants Completing Screening

| Portsmouth GDP | | | | | |
|----------------|------------|-------------------------|--------------------------|-------------------------|------------------------|
| Mean Age (SD) | Age Range | Mean Years at Site (SD) | Mean Years in Trade (SD) | Avg Year First Employed | Avg Year Last Employed |
| 62.6 (11.3) | 34.0-87.0 | 4.2 (5.9) | 17.5 (16.6) | 1973.8 | 1985.0 |
| Paducah GDP | | | | | |
| Mean Age (SD) | Age Range | Mean Years at Site (SD) | Mean Years in Trade (SD) | Avg Year First Employed | Avg Year Last Employed |
| 68.1 (12.5) | 36.0-(9.0) | 3.3 (4.6) | 24.5 (16.6) | 1966.1 | 1975.0 |

Trades: Asbestos Workers, Boilermakers, Carpenters, Cement Finishers, Electrician, Iron Workers, laborers, Operating Engineers, Painters, Plasterers, Cement Masons, Plumbers, Pipe & Sprinkler fitters, Sheet Metal Workers, Teamsters.

workers at Paducah GDP had begun wearing a badge or dosimeter either when hired or later on. It is striking that a similar percentage, 42%, of the Paducah cohort reported they had "never" worn a badge or dosimeter. At the Portsmouth GDP facility, 33% of the construction workers examined reported wearing a badge or dosimeter at some time, whereas 32% reported that they had never worn one.

(2) FIGURE 2 provides the results of the question "Did you continue to wear a badge/dosimeter after first issued?" Construction workers at both sites reported that almost half of them did not continue to wear a badge/dosimeter after one was issued.

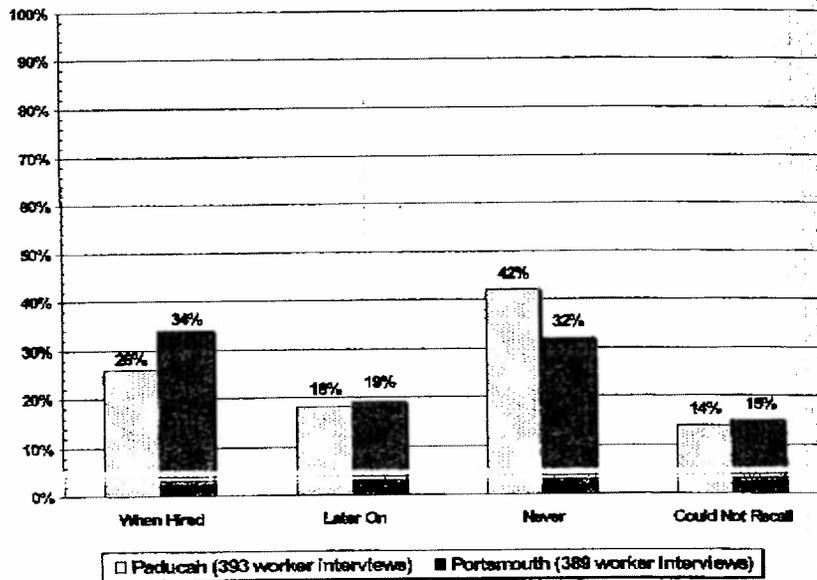


FIGURE 1. When did you begin wearing a radiation badge/dosimeter?

TABLE 2. Why were you scrubbed down?

Example Responses:

1. Got a high reading on hands or body;
2. Exposed to yellow dust
3. While working building the cells in the X-326 building, just in street clothes. We were told that this was clean area. We were worked there for about a month and then we were told that it is a hot area. They sent us to the showers and they gave us new shoes and coveralls. I am concerned about all the radiation I took home to my family.
4. I was running conduit overhead. I was dressed in my street clothes. When I climbed down the ladder, I noticed that I was covered in a greenish-yellow dust. I went to my foreman who told me to go to a health physics. They took me to the showers and told me to shower. I could not get clean even after several showers and they took me to the hospital where I showered several more times in an unknown solution. They had to incinerate my clothes.

- (3) In an effort to determine whether data from the badges or dosimeters were kept specifically for each individual, we asked the question in FIGURE 3. It is clear that many construction workers could not recall this information. However, about 23% knew that they did not wear a badge or dosimeter that was specifically assigned to them.
- (4) FIGURE 4 reflects the fact that about 25% of the construction workers recalled that there was no change of film in their badges or exchange of old badges for new ones.
- (5) FIGURE 5 presents data that indicates construction workers were not asked to place the badge or dosimeter where it would not detect radiation.

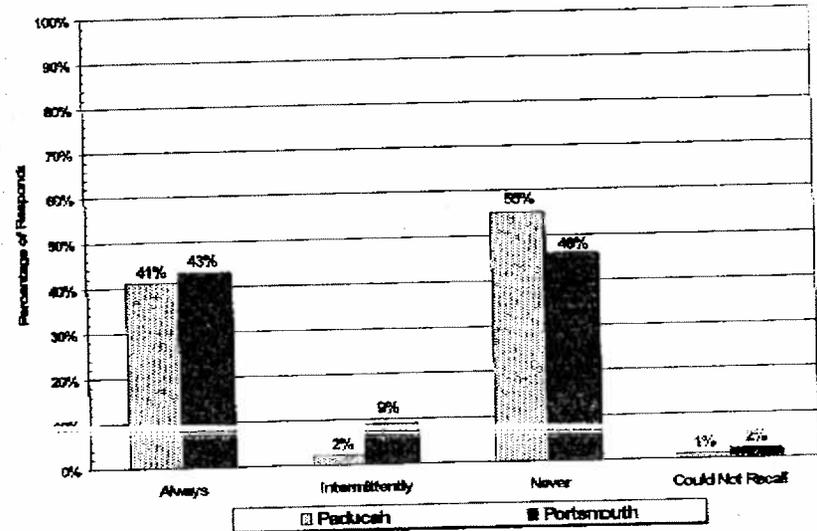


FIGURE 2. Did you continue to wear a badge/dosimeter after first issued?

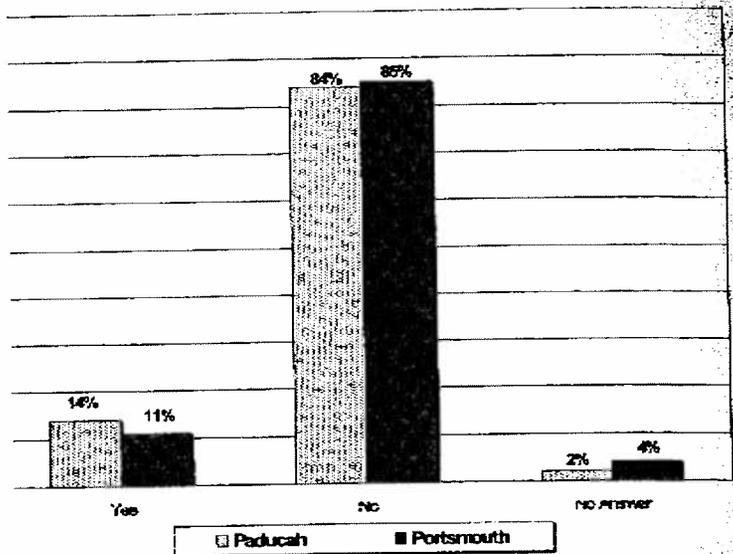


FIGURE 6. Did you ever have to be decontaminated or scrubbed down?

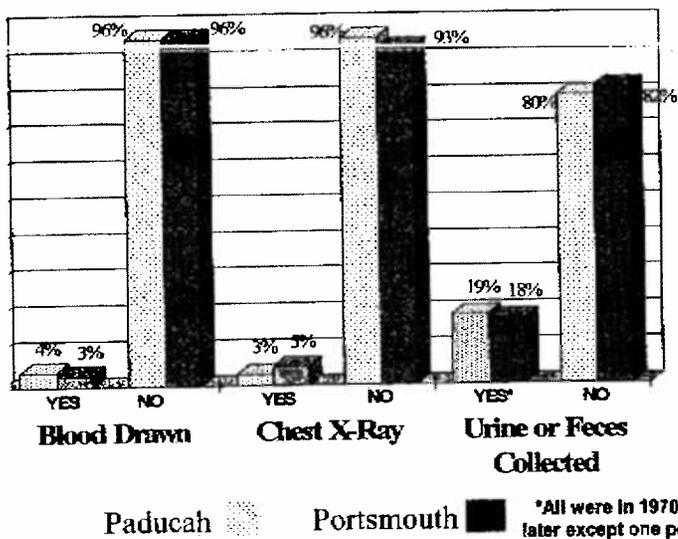


FIGURE 7. Aside from a normal physical, have you at work ever had:

heless, more than 30% of the construction workers at these two sites never wearing a radiation-monitoring badge or dosimeter. Only a centage of construction workers knew they had a specific badge ster and even fewer knew about maintenance or calibration. A very nber of workers reported putting badges or dosimeters under lead

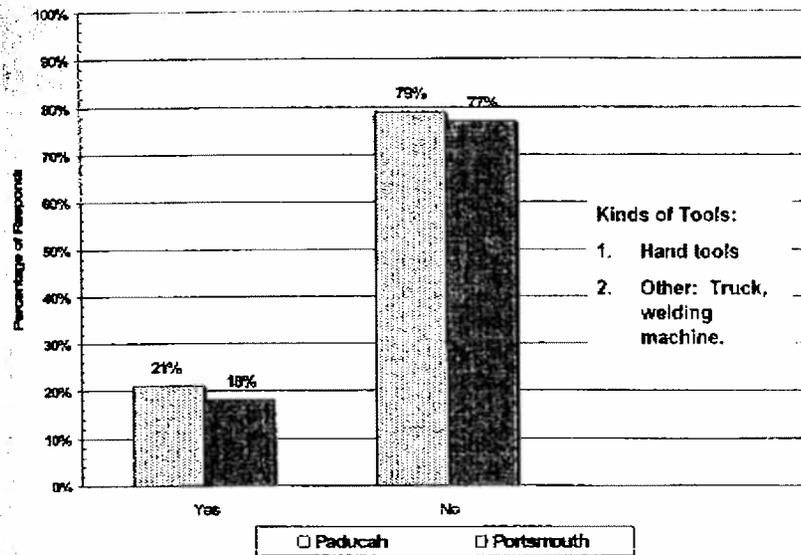


FIGURE 8. Did your tools or equipment have to be decontaminated or replaced when you finished work?

aprons. More than 10% of the workers reported decontamination procedures. About 20% reported contaminated tools/equipment so it can be assumed these construction workers were in "hot" areas.

These are highly skilled and experienced workers. Yet their knowledge of the potential for exposure to one of the most critical risks they might face in these workplaces is clearly very deficient. For anyone with experience in construction safety and health, this is not surprising, but it is alarming. In construction, workers are expected to look after their own safety and health to a much greater degree than in general industry, and these findings clearly demonstrate that this is also the case for radiation risks. At the same time, these findings beg the question, how can one expect workers to look after themselves when the information they receive or have available to them about a critical risk is so limited and deficient? And more importantly, while the reality of the construction industry dictates that workers look after themselves, the law says that it is the employer's responsibility to assure that workers are protected. These findings show clearly, that in these sophisticated workplaces that are owned by the government where the very best construction employers perform work, the workers were greatly let down in terms of basic occupational health protection.

One can only wonder: if conditions were so deficient in such a sophisticated work environment, how deficient is the level of protection for all those workers who are employed elsewhere in the construction industry?

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