

Study on Doses of Ionizing Radiation Received by Transport Workers in Canada

Sylvain Faille
Transportation Advisor
Canadian Nuclear Safety Commission
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Introduction

As of May 31, 2000, the Canadian Nuclear Safety Commission (CNSC), formerly the Atomic Energy Control Board (AECB), was created and a new Act and new Regulations were adopted. Under the new regulations, the limit of exposure for members of the public was revised to a maximum of 1mSv/year. Also, starting June 1, 2002, section 18 of the Packaging and Transport of Nuclear Substances Regulations will require the carriers, consignors and consignees to implement a radiation protection program. The CNSC plans to develop guidance material to assist in the development of radiation protection programs.

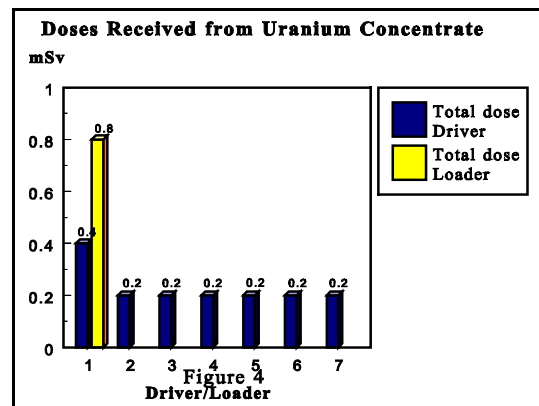
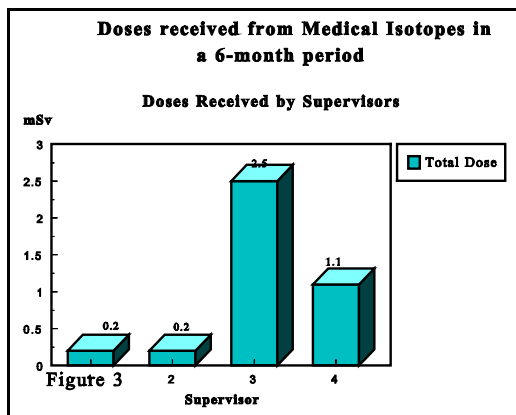
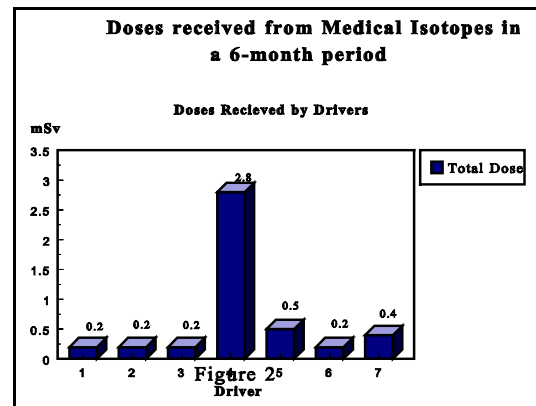
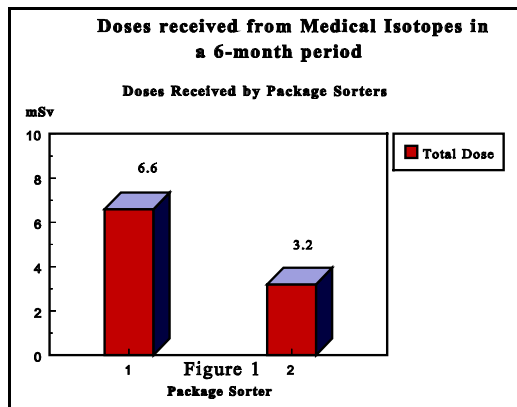
In order to develop the guidance material, it was decided to investigate the magnitude and likelihood of exposure by conducting a multi-phase study to evaluate the doses of ionizing radiations received by transport workers. The first phase of the study was completed in September 2000. It involved the gathering of general information on the transport of radioactive material in Canada and identified the areas of concerns for all modes of transport. The second phase of the study will be starting shortly and will include measurements of doses received by a selected population of transport workers. Documentation on work procedures currently in place within the selected companies will also be examined.

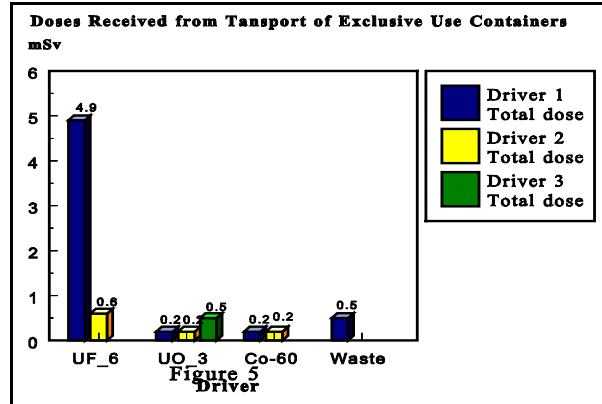
A similar study, completed in 1988 showed that doses received by the majority of transport workers were below 5mSv/year, the limit under the old regulations for members of the public. Up-to-date information in that area is deemed necessary as the limit for members of the public had been lowered and that the transportation industry may have changed significantly over that period.

Completion of the second phase of the current study would provide a better understanding of the doses received in different transport areas. This will form the basis for providing/evaluating guidance on radiation protection programs for carriers, consignors and consignees.

Background

The study to measure the dose of ionizing radiations received by transport workers conducted in 1987-1988 involved a total of 31 workers in 9 trucking companies. The study covered shipment of medical and industrial isotopes as well as uranium fuel cycle material and its associated radioactive waste. Figures 1 to 5 show the total dose received by the transport workers reported in the 1988 study. The data collection lasted 6 months. Extrapolation of the results indicated that most transport workers would receive less than 5 mSv/year which was the annual limit for members of the public. It was determined that the workers involved with the shipment of radiopharmaceuticals could be expected to receive an annual dose greater than 5 mSv/year. The study recommended that a more detailed assessment be conducted.





Current Study

In 1999, a multi-phase study to evaluate the doses of ionizing radiations received by transport workers was initiated. The first phase of the study was completed in September 2000. The focus in this phase was on gathering of general information on the transport of radioactive material in Canada and identifying areas of concern for all modes of transport. A literature review of experience in assessing doses received by transport workers and the implementation of a radiation protection program was also completed. The results showed that most publications on doses received by transport workers had been conducted in the 1970's, 80's or early 90's and that road shipments was the mode of transport for which the doses are expected to be the highest. One study also suggested that workers at air terminal having high volumes of radioactive packages could also be receiving high doses. The literature review did not uncover information on the implementation of radiation protection programs for carriers.

The second part of phase 1 was to conduct a survey to identify a list of major shippers of radioactive material in Canada, the type and quantity of material transported and the means of transport used. A survey questionnaire was prepared and mailed to 33 companies. A total of 14 was returned even though 29 companies agreed to return it. It was concluded that few shippers recognize shipment of radioactive material as a significant portion of their work and thus were reluctant to take part of the survey.

The third part of phase 1 was to conduct site visits to witness how the packages were packed, handled and transported. The site visits were difficult to plan since it was hard to arrange in advance at a time when radioactive material packages would be handled.

The conclusion of phase 1 indicates that road transport workers and workers at air terminal should be included in the dose measurement of phase 2. The use of survey questionnaires should be avoided and that other ways of information gathering should be investigated.

Phase 2 of the study is schedule to start in October 2001. This phase will include measurement of doses of ionizing radiations received by a selected population of transport workers. The objective is to involve at least 15 transport companies including courier, freight companies, bulk companies and air cargo companies that are representative of the Canadian industry. Approximately 150 transport workers will have their radiation doses monitored for 6 months. In addition, any information on existing radiation protection programmes and work procedures from the companies involved in the study will be collected. This phase is schedule to be completed by September 2002.

Once completed, the results of the doses measured will be analyzed and a review of the radiation protection program and work procedures collected will be performed in order to develop guidance documents for carriers, consignors and consignees to help them in developing their radiation protection program. A graded approach will be used but the grades will depend on the results of the doses measured during phase 2 of the study and an assessment of the efficiency of existing procedures.

Foreseen Problems in completing Phase 2

Some potential problems related to Phase 2 of the study have been identified and solutions have been developed to prevent or to circumvent these problems. One of the main issues is the selection of 15 companies, representative of the Canadian industry, that will agree to take part of the study. As seen in phase 1, it was difficult to get companies which had agreed to participate in the study to fulfill their commitment. A number of transport companies contacted have shown interest in the study but efforts are ongoing to convince the remaining companies to participate. In order to do so, effort will be put into demonstrating the value of the study for this company and in convincing them that only a limited effort will be required from them if they decide to participate.

Another potential problem is that workers may not consistently wear their TLD. Since most of the individuals that will be involved are not familiar with TLD badges, some might forget to wear them each day or may lose them. To avoid as much as possible this problem, each worker will be invited to a seminar where the importance of properly wearing the TLD will be explained and a brochure will be given to them to explain how and when they should be wearing their TLD.

Conclusion

Once this study is be completed, the CNSC should be able to develop guidance material for radiation protection programs that will reflect the Canadian industry and will not put unnecessary burdens on the transportation industry.

Awarding a contract for this multi-phase study proved harder than expected. This project revealed that not many contractors possess a good understanding of the details of the transportation industry and of the Packaging and Transport of Nuclear Substances Regulations. This resulted in a several months delays in the start of phase 2. As a consequence, the results of the study will not be available in advance of the in-force date of the regulatory requirement for a radiation protection programme. As guidance to the industry on developing a practical radiation protection programme that is linked with the likelihood of exposure to ionizing radiation received by transport workers cannot be made in advance of the effective date of the new requirement; the CNSC has to explore options to assure a smooth transition to the new requirement.

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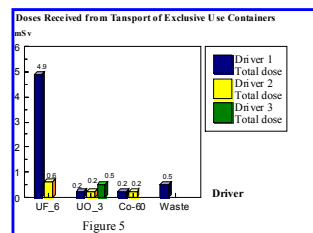
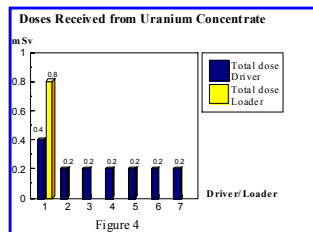
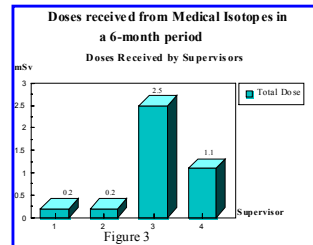
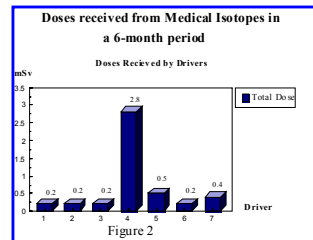
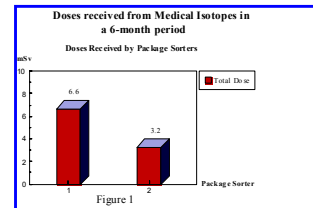
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