

Aircrew dose assessment and registration in The Netherlands

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ABSTRACT

The European Directive 96/29/Euratom addresses the protection of workers against enhanced exposure to natural radiation and includes the exposure of aircrew in its article 42. This article has been implemented in Dutch regulations and the JAR/OPS stating that the dose of aircrew must be assessed and registered in the national dose register (NDRIS) for all flights above 8 km. In co-operation with several aircraft operators NRG has build an information system for aircrew monitoring. For each flight the dose is calculated using the computer generated flight plan for that flight. Each month the crew assignments are combined with the dose-per-flight data into an individual dose for each crewmember. The system is essentially independent of a dose calculation program but currently CARI-6M is used.

For the dose calculation, the flight plans that are generated by the flight planning systems of the operators are used, and not the profile of the actual flight. The actual profiles are available either as hand written logs or as log files that are generated for aircraft maintenance. The use of the captain's logs is not feasible a.o. because of the number of flights being approximately 400 per day. The use of the maintenance log files would need building a significant amount of new software for linking these databases with the flight plan and crew databases. However, before accepting the use of computer generated flight the validity of this approach was tested.

For 12 selected routes, 10 flights were analysed. For each of the 120 flights the dose was calculated based on the computer generated flight profile and based on the flight profile from the hand written log. The doses were calculated using Cari-6M, Epcard-3 and using the algorithms by Lewis et al.[Le01] and by Ferrari et al.[Fe01]. The variation between the doses for one destination and one method was used to estimate the type A uncertainty in the dose as 10%. The full range of the difference between the dose calculated

from the actual and computer plans yields a type B uncertainty of 7% and the differences between the doses four models a type-B uncertainty of 10%. This results in a combined uncertainty of less than 25%. This means that a dose calculated with our method will have a high probability of being within the ICRP recommended range of 1/1.5 to 1.5 around the true value.

Using the procedure described above all flights of the major Dutch airlines have been processed. The average dose per flight for all flights was 31 μSv , for continental flights 6.7 μSv and for intercontinental flights 60 μSv . The average annual dose per crewmember was approximately 2 mSv, the most frequently occurring dose approximately 2.5 mSv and the maximum dose 5.1 mSv. The collective dose for 2002 was 20 manSv.

References

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Fe02 Ferrari, A., Pelliccioni M., Rancati T. Radiat. Prot. Dosim. 93 (2) 101-114 (2001)