

## STUDY CASE N° 13: RADIOLOGICAL INCIDENT IN MACEDONIA AND ITALY

*European ALARA Newsletter – Issue 13*

### □ The event and its radiological consequences

On June 2001, a foundry in Skopje (Macedonia) sent 32 steel slabs of different sizes (total amount about 65 tons) to three shipyards in Italy, as follows:

- a) 12 slabs were sent to the harbour of Ancona;
- b) 19 slabs were sent to the harbour of Palermo;
- c) 1 slab was sent to the harbour of Livorno.

All the slabs were contaminated with detectable quantities of cobalt-60.

Surveys carried out with a portable multichannel analyser showed that the contamination was due to cobalt-60, with a concentration of about 1 Bq/g. Direct measurements gave 3  $\mu\text{Sv/h}$  at maximum at a distance of a few cm; at a distance of 1 m, 1  $\mu\text{Sv/h}$ ; at a distance of 3 m, the equivalent of the background was measured.

The contamination was detected because of the following events:

- 1) The Ancona shipyard used 12 slabs to build two fishing boats;
- 2) On October 2001 the shipyard sent its metal scraps to a firm that usually gathers scraps to be sent to a foundry;
- 3) This firm monitored these scraps, according to Italian law procedures, and detected some radioactive contamination;
- 4) The firm notified the local Police Body.

The contaminated slabs were traced and found to be produced in Skopje (Macedonia) and traded in Italy through a trading firm to the shipyards referred above.

The slabs sent to the harbour of Palermo were simply stored; the slab sent to the shipyard of Livorno was used in the same period. Surveys were performed in all three harbours according to criteria and procedures agreed among the involved surveyors.

Information about the contamination was obtained by the foundry in Skopje:

- a) In two castings, of about 100 tons each, cobalt-60 contamination was detected with activity concentrations of 0.831 Bq/g and of 0.609 Bq/g, respectively;
- b) The preceding five castings were reported free of contamination. No information could be obtained concerning the five following castings. The total production of contaminated steel amounted to 200 tons, of which 35 tons were sent to Italy. No information is available concerning where the other 135 tons were sent.

The trading firm considered the detected contamination in perfect compliance with the Italian legislation. However, the Italian laws for radiation protection state that the exemption level of 1 Bq/g is not valid for recycling and waste management. For components with a contamination lower than 1 Bq/g, their use is allowed only if the annual dose to any member of the public is less than 10  $\mu\text{Sv/y}$  and the collective dose is less than 1 Sv/y.

At Ancona, surveys and measurements were performed by the relevant Regional Authorities for Environmental Protection (ARPA) in co-operation with the police and a surveyor from ANPA (the National Agency for Environmental Protection). At Livorno, surveys and measurements were performed by the relevant Regional Authorities for Environmental Protection (ARPA) in cooperation with the police. At Palermo, the local laboratory for Hygiene and Public Health co-operated with the police body.

At the harbour of Ancona:

- 1) Almost all the slabs had already been used to build two fishing boats; the contaminated components of the two boats were readily identified; the affected areas were identified and declared “restricted areas”;
- 2) Powders and scraps produced during the building of the boats were identified, collected and removed from the areas normally occupied by workers, in a sealed container. No removable contamination was left in these last areas;
- 3) The remaining slabs were put in the same containers;
- 4) The relevant workers were likely to have been exposed to doses less than 1 mSv, but in any case their exposures are to be considered as not justified;
- 5) As for internal contamination, carpenters and welders (25 workers) immediately underwent whole body monitoring at the ENEA Centre of Bologna. No internal radioactive contamination was detected.

At the harbour of Livorno, 1 slab was used in the building of a boat; this boat was seized and measurements were carried out on scraps and powders. The same criteria as for Ancona were adopted. At Palermo, the 19 slabs have not been used yet. All the slabs were seized and set away from any unauthorised access.

On March 2002, the judge in Ancona responsible for the case stated that all the remaining slabs in Palermo, powders and scraps gathered in Ancona and Livorno should be sent back to the foundry in Skopje. Components of relevant sizes were cut into smaller parts in restricted areas; all the areas were covered with plastic sheets; air samplers were used to monitor air contamination during all the procedures. All the involved areas were left free of radioactive contamination. The work was completed and all contaminated materials were sent to Skopje by October 2002.

#### **❑ Lessons learned and conclusion**

In conclusion, this event is not thought to have resulted in significant radiation exposures to either workers or members of the public. Nevertheless it should be stressed that small doses could be delivered to a large number of members of the public, if metal tools or consumer goods with a very low contamination are distributed among the population. In this case the missing 135 tons of contaminated steel surely will cause some exposure to some people somewhere in the world.

A further consideration is that EC Directives and the national legislations focus on the problem of contaminated scrap metal. In this case, the contamination was associated with freshly manufactured material. In order to avoid such events, newly manufactured materials should be controlled in the same way as scrap metal, when crossing every checkpoint at any European border.