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Workshop on Radioactive Contaminated Metallurgical Scrap

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MEASUREMENT OF RADIOACTIVITY IN STEEL

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Summary

Even after the control of scrap deliveries, there remains a small risk that the radioactive contaminated scrap passes the detecting devices. Therefore, the chemical laboratory takes a role to measure each heat for the absence of artificial radioactive nuclides with a g-spectrometer equipped with Nal-detector. As the measurement must be performed in sequence with the steel production process, the allowable time for the measurement is quite limited. On the other hand, there could be still some possibility that background radiation might be present as the samples may contain some natural radioactivity. The task is how to differentiate the nature of radioactivity between naturally remaining radioactivity within safe limit and artificial nuclides present in the sample at a low level even though a very small amount of radioactivity could be detected in short time in both cases.

We have set the alarm limit to 0.1 Bq/g for Co-60 as indicating nuclide. This limit is set more than 4 s (s=standard deviation) from the average background radiation. Therefore, false alarms are quite improbable.

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Strategy

The Nal-γ-spectrometer performs a gross-γ-measurement but it can not differentiate the nature of the nuclides present. If the alarm limit is hurt, the sample is measured on a high resolution of γ-spectrometer with Ge-detector for identification of the γ-emitting nuclides.

Calibration

Even though no appropriate international standards are adapted and no commercial measuring equipments are commercially available, the desired standard should contain Co-60 in the order of 1 to 100 Bq/g. The presence of other γ-emitting nuclides is desirable. In the Workshop we will present how to surmount this difficulty.