THE FRENCH CENTRALISED LOW LEVEL RADWASTE TREATMENT CENTER NAMED CENTRACO

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SUMMARY

Socodei, a subsidiary company of EdF and Cogema is commissioned to design, finance, build and operate two low level radwaste treatment facilities : a contaminated scrap metal melting unit, and a solid and liquid waste incinerator.

These units frame a low level radwaste treatment centre named Centraco, located near Marcoule in the south of France, and will receive in 1998 waste coming from dismantling, maintenance and operating works of French and foreign nuclear sites.

The decision to create this centre is due to the low density and large variety of low level radwaste which take a volume out of proportion with their activity, specially in the surface storage centre. Up to now, all low level radwaste were sent and stored with no treatment optimisation in surface storage centres.

Socodei proposes in one single site, to optimise low level radwaste management and reduce the volume of ultimate waste to be stored : in a ratio of one to ten by casting ingots coming from melting contaminated scrap metals ; in a ratio of one to twenty by encapsulating earth ashes and ashes resulting from incineration of solid and liquid waste.

This is a centralised treatment centre and that's why Centraco is a new waste management system. Getting together all means in one place reduces costs, avoids mismanagement and risk increase, and allows consistency in safety, environmental impact, transport and personnel radioprotection.

BACKGROUND AND GENERAL FEATURES

Today, low level radwaste generated on nuclear sites are compacted and shipped in metallic casks to the burial French landfill site operated by ANDRA (Centre de Stockage de l'Aube). Waste are coming from nuclear plants (EDF), reprocessing factories (COGEMA) and from labs (CEA) and hospitals.

EDF and COGEMA have ascertained needs to limit low level radwaste volume and environmental impact of waste coming from their sites. Moreover, in July 1992, the French government enacted a law which assigned industrials to enhance value of all their waste in order to get reusable materials from these so that ultimate waste alone are landfilled. SOCODEI has been founded to adress this issue.

CENTRACO holds two low level radwaste treatment units on a 100 000 square meters area : First is the incinerator designed for 3 500 TPY of combustible solid waste and 1 500 TPY of liquid ; Second is the melting furnace designed for 4 500 TPY of scrap metals.

Low level radwaste management is carried out using one of these two process lines, incineration and melting. All waste generated by the process lines - slag, refractory, baghouse filters, earth ashes and fly ashes,... - are encapsulated in order to be sent to the surface storage center.

All packages belong and are allocated to customers in proportion to their inlet processed weight.

WASTE ACCEPTANCE CRITERIA

Low level radwaste containers or packages are accepted if data sheets specifying nature and level of radioactivity, chemical and physical nature are in agreement with Centraco's acceptance criteria. Waste are then oriented to the optimal process and are stored on site to be processed by campaigns.

The main waste acceptance criteria are :

- Alpha activity level has to be less than 370 Bq/g per package and beta-gamma activity level has to be less than 20 000 Bq/g per package (metal melting & incineration),
- Incoming packages can be drums, metallic boxes or containers less than forty feet length. Pieces have to be less than twelve meters long and fifteen tons weight (metal melting),
- Plastic films and wood wedges for loading are accepted but explosive, inflammable and toxic stuffs are prohibited. All metals are accepted except mercury (metal melting),
- Incoming solid waste packages can be closed cardboard drums or metallic drums (incineration),
- Incoming liquid waste packages can be drums or tanks (incineration),
- Metals, aerosols, batteries and explosive and mercurial stuffs are prohibited (incineration).

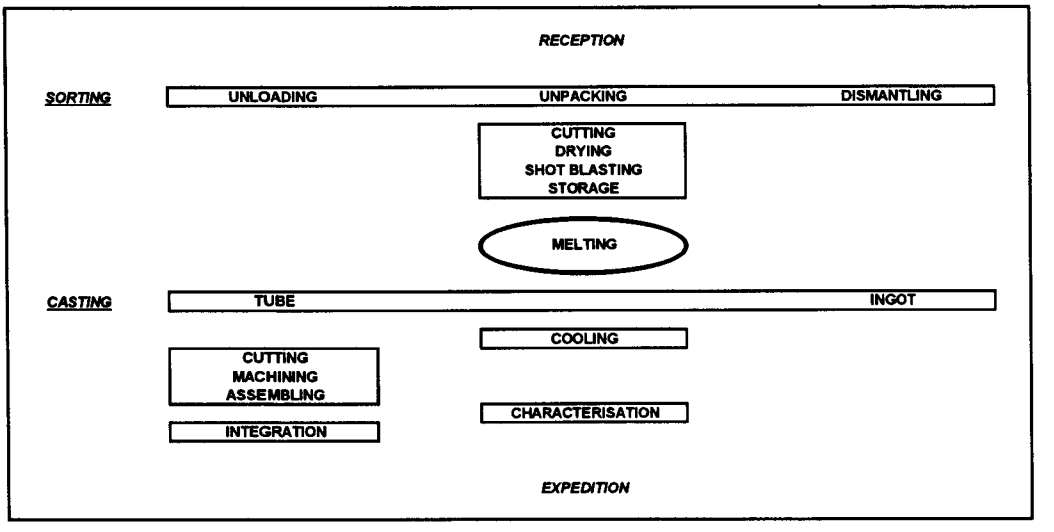
SCRAP METAL MELTING PROCESS

Scrap metals coming in twenty feet containers from the nuclear sites are unloaded and sorted out according to the nature of radioactivity and metal quality - carbon steel, stainless steel and non-ferrous metal. Scraps are first dried out to remove water, then shotblasted to remove painting if necessary.

The high efficiency induction furnace runs at 1 600°C and produces on top of the molten bath, slag with high content of radioactivity scrapped out in specific casks. The molten bath is poured out afterwards in casting casks previously preheated at 850°C.

Molten metal is put either in casts to produce ingots, or in a centrifuge to manufacture tubes. These cylinders are welded with non contaminated disks in order to manufacture shields for casks.

These casks are used to encapsulate and store ultimate waste of high level activity such as spent IER (ion exchange resins) or incinerator ashes.



INCINERATION PROCESS

The twenty feet containers coming in from the nuclear sites are loaded with closed cardboard drums of solid low level radwaste. Drums are unloaded and sorted out according to their heat content and nature of radioactivity, and are sent to the incinerator buffer storage.

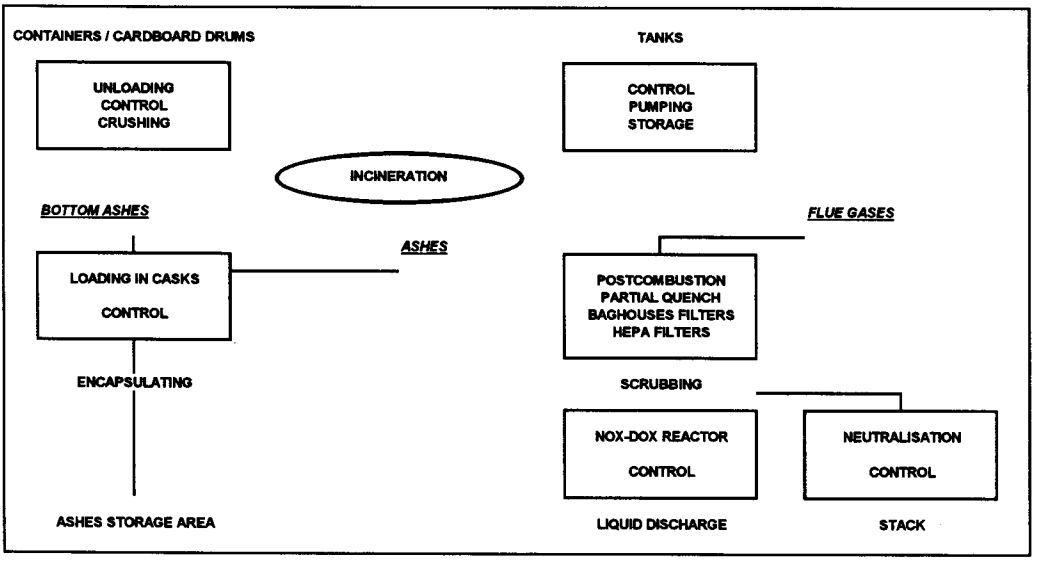
Liquid waste are coming in various containers and are sucked out towards storage tanks specifically devoted to different kinds of liquid. Drums are fed directly without opening through an air lock at the top of the furnace primary chamber at a temperature of 900 / 1 000°C. Liquids are pumped directly out the storage tanks to the corresponding injectors.

While burning, solid waste is moved forward to the end of the chamber by two air-cooled screws, and the resulting bottom ashe is collected by gravity in special high containment casks. Liquid waste is injected through air atomising nozzles in the same chamber.

Support fuel oil is used when the waste heat content is too low. Cooling water is injected on the opposite when the waste heat content is too high. In a secondary combustion chamber, a final combustion is achieved at 1 200°C, in compliance with regulations for incineration.

Flue gases are then cooled down in a partial quench tower to less than 200°C before filtration in series in a bank of baghouse filters and a bank of HEPA filters. Fly ashes are collected in confined casks at the bottom of baghouses filters.

The flue gas treatment consists of two scrubbing towers to remove halogen acids, sulfur dioxide and of a catalytic reactor to remove nitrogen oxides, dioxin and furan. The treated flue gases are discharged through the stack of the site after on-line regulatory control.



COMMENTS

Centraco was asked to be a model plant, and as example has used the ALARA approach right from the early stage of the design. This means that all working stations are optimised to limit the annual dosimetry of the personnel, including both operation and maintenance people.

Centraco will be the link between nuclear sites and surface storage center. The start-up of the melting facility is expected in September 1997, the incinerator will be in operation in May 1998.