ONE EXAMPLE OF STMI'S EXPERENCE IN THE FIELD OF RADIOACTIVE WASTE CONDITIONING

Samuel Cohen
Technical Branch
Head of Radioactive Waste Conditioning Dept.
STMI

ABSTRACT

Radioactive wastes have various origins and diverse physical states. To condition them, one of the essential criteria to be taken into account by the waste producer is the economic aspect, without disregarding, though, to meet all norms and regulations in force, which include security and long time resistance of produced drums. A waste conditioning technology has to be selected taking into account the waste producer's choice criteria (economy, safety, time limits,...), the tenderer's criteria (easiness of operation, type of operation, ...), and regulation criteria. The choice of a conditioning technology implies that the producer and the operator act in concert. STMI's strength in the radioactive waste conditioning field is due to its wide experience and use of aquired knowledge, from preliminary studies to on-field work.

STMI has been in charge for more than two years of embedding process wastes (saturated ion exchange resins) of EDF PWR nuclear plants, using mobile embedding units. Thanks to its experience, STMI considerably improved and perfected these machines.

THE CRITERIA FOR THE CHOICE OF A WASTE CONDITIONING TECHNIQUE

In France, the nuclear waste producer, is the operator of a nuclear facility. Waste conditioning is obviously not his main objective. When such a problem appears, he can call on a service company specialized in that field, entrusting him with a mission in which, in most cases, only time limits are imposed: he has to remove the wastes from the nuclear plant, in order to transform them into final acceptable wastes, for a definitive waste disposal.

In this context, STMI, which activities cover decontamination and dismantling operations as well as the operation of the French radioactive waste disposal (Centre de la Manche) looks for a compatible solution which includes essential criteria.

The Waste Producer Choice Criteria

These choices are economical, and take into account:

- the whole chain of actions, from removal to storage, including planning, as the wastes may have to be removed in order to get the site free for other uses,
- the safety, for the workers directly involved in waste conditioning as well as for all the personnel working at the nuclear plant.

The Criteria Relative to the Tenderer

These criteria deal mostly with easiness of maintenance, operation, routine or hot intervention, i.e. easiness to decontaminate the part of operating plant in contact with radioactive products, as well as safety and health physics of all necessary workers.

STMI is deeply involved in the taking into account of these criteria during operations preliminary studies. This is stemming from its experience of similar situations and the participation of its operating teams to the on-field work.

Defining Regulation Conditions

- waste transportation before or after conditioning,
- observance of specifications relative to safety at working posts, defined in the plant safety report,
- conformity of conditioned wastes with the basic rules emitted by government commissions, and with the specifications proposed by ANDRA.

In this last group of criteria, the technical demands are so accurate that in most cases, they lead to eliminate most of existing processes. Once this elimination is done, the choice of the waste conditioning method will depend on the combination of all the other criteria. All these operations will be held after writing a Quality Assurance Manual for the whole operation.

In conclusion: the choice of a waste treatment, conditioning and confinement method requires a perfect close cooperation between the producer and the operator. There is no perfect a priori process.

STMI'S EXPERIENCE - MAKING USE OF THIS AQUIRED KNOWLEDGE

STMI's waste conditioning department performs many operations for its customers, from the intervention preliminary studies, to the operations themselves and their interpretation. This continuity within the same company between preliminary studies allowing a choice between the different options, corresponding design studies, intervention operation and the final synthesis of all these operations allows to draw conclusions at different phases:

- about former operations at the waste producer,
- about bringing into operation the chosen process,
- about the choice of the process itself.

STMI's technicity is due to the application of its aquired knowledge, which is demonstrated below with a few examples.

STMI performs specific operations for its customers. In particular, STMI has been in charge since 1981 of embedding process wastes (saturated ion exchange resins) of EDF PWR nuclear plants, using two mobile embedding units. At this date, more than 3,000 drums of encapsulated resins have been sent to the storage center. This operation, and the conclusions one can draw are a perfect illustration of the hereabove displayed approach. The lessons drawn from this operation are relative.

The Choice of Equipment

After realizing the first spent ion exchange resins embedding machine, using polystyrene as plymer, EDF asked STMI to realize a second unit according to the same process, which allowed to optimize a few points, without largely modifying realization costs:

1. harmonization of functional design, by separating on the machine each of the elementary systems (control desk, auxiliaries, perparation of embedding solution, waste volume rating, embedding),

2. personnel physical safety, equipping the machine with access platforms to working posts, and health physics through the better design mentioned in (1), and the optimization of radiation shieldings,

3. working pace by the design of a new transfer system, and of a platform allowing to create new conditioning posts,

4. protection of equipment by the use of screenings and cameras at the most sensitive places,

5. separation of areas submitted to radioactive hazard from areas submitted to chemical hazard, by the realization of a complementary equipment used for storage and preparation of embedding solutions.

Production of New Equipment

The need to characterize embedded resins, in particular the distribution of the activity, led STMI to provide a new equipment to measure volumic activity and allowing to limitate the number of γ spectrometries and to validate them very soon after the measures are made on site. This measure equipment, called DIMAV, (Ionometric Device for Volumic Acitivty Measurements) allows, through double measure of exposure rate, and analysis of the variation of these measures ratio, to confirm or invalidate an average spectrum measured at the beginning of the operations, a new spectrometry being necessary when the first spectrum is invalidated. The spectrum can then be recorded on tape, phone transmitted to the central laboratory, and validated by automatic counting. This complete chain of equipment has been called DIANE (Industrial Device for Nuclear Waste Analysis). In that case, laboratory measure techniques are adapted to industrial operation. STMI's Measure Department also develops measurement methods based on aquired experience, and which will succeed shortly. The aforementioned system allowed STMI's customer to save a lot of money in performing measures; it also increased the reliability of the system.

In another field, the operational experience due to these mobile embedding machines allowed STMI to come to a new design of the containers in which wastes are embedded, associating an economic profit, the optimization of confinement, and biological shielding.

Consequences on Further Operation

STMI's experience in this field allows us to foresee consequences at two levels:

1. a possible optimization of operation procedures aiming at making easier conditioning operations, and therefore lessening costs and constraints,

2. the demonstration, as part of its operation, of the necessity to obtain wastes to condition characterized with very accurate data, allowing if necessary to discriminate the wastes according to their nature, their activity or the various possible treatments. Activity measurements prior to the operations will allow a better selection and definition.

CONCLUSIONS

Consequently, it is obvious that the aquired experience evoked hereabove allows all the intervening parties to approach new studies and new operations with the help of common sense criteria, that are often, unfortunately, turned down when new problems show up, without taking into account the profits of experience. These criteria are: technical performance, facility to operate, intervention and maintenance facility, security and health physics, quality.

STMI affords the complementarity of studies and operations so much independent that the profit acquired by one of them gives rise to improvements for the other; this complementarity is made possible by the tight association of the study and operational departments which work in perfect symbiosis, though they keep their specificity. With such an organization, and with the help of new ideas, technology will progress, and simultaneously, operation too.