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VALUATION OF A STERILISATION PLANT USING GAMMA IRRADIATION

INTRODUCTION:-

We, the Plant and Machinery valuers, receive request from clients for carrying out Valuation of Plant and Machinery used in a unit having very restricted technology. In such cases, before carrying out the valuation, first we need to understand the technology then only we would know the importance of each of the plant and machinery item used in that unit and carry out correct and precise valuation of those plant and machinery items. In this article, I have tried to discuss valuation of a unit which uses gamma irradiation process, which is a very restricted technology not only in India but across the world. May be this

article can help valuers who receive such kind of valuation requests from their clients.

WHAT IS GAMMA IRRADIATION:

As we are aware, that radioactive materials emit mainly three types of radiations which are important to us¹ viz:

Alpha Rays, Beta Rays and Gamma Rays. So let's understand Gamma Rays further.

GAMMA RAYS: These are electromagnetic rays like sunlight having very high energy but no mass. Hence they can penetrate into our bodies.

Depending upon the energy levels of gamma rays lead or concrete walls as thick as 2 meters are required to minimise the radiation effect (some gamma rays still pass from these walls). High exposure to gamma rays lead to cancer and related ailments.

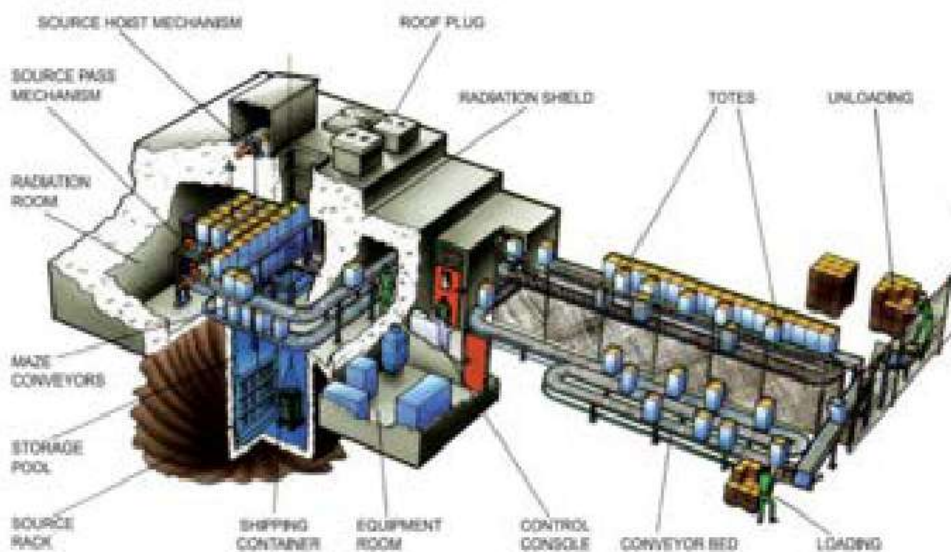
GAMMA IRRADIATION PROCESS:

The gamma irradiation process uses Cobalt 60 (Co60) radiation to kill microorganisms on a variety of different products in a specially designed cell. Gamma radiation is generated by the decay of the radioisotope Co60, with the resultant high energy photons being an effective sterilant. A key characteristic of gamma irradiation is the high penetration capability, which allows for delivery of target radiation dose to areas of products that may be higher in density²

GAMMA IRRADIATION UNIT SET UP:

To construct the gamma irradiation unit/plant, first and foremost is, permission from Atomic Energy Regulatory Board (AERB) is a must and then as per the strict guidelines of AERB⁴ the construction of the irradiation plant can be started. Due to the high radioactivity involved during the operations, there are very few vendors in India who possess the technology to build Gamma Irradiation plant. Again all these vendors are certified and monitored by AERB for their respective area of expertise and the irradiation plant owner have to purchase the products and services directly required for the irradiation plant from these vendors only.

Schematic Diagram of the Gamma Irradiation Plant (P & M Items):



So as can be seen from the above schematic diagram, the plant and machinery valuer has to carry out Valuation of not only the movable items such as conveyors, totes, etc. but also of the encasing concrete structure (the way we carry out valuation of machinery foundation), water well used to cool down the Co60 source, etc. Once we understand the technology, then the Valuation becomes a straight-forward process.

Due to high radiation activity inside the actual radiation chamber, anybody including the plant and machinery Valuer cannot go inside the plant for inspection while the plant is in operation or Co60 source is there inside the chamber. So the valuer has to trust various measuring units installed inside the chamber to measure the irradiation severity of working of the plant and above schematic diagram only.

VALUATION APPROACH:

Let's discuss about the Valuation approach which can be followed for these kind of plants:

This is a restricted technology as per Indian Parliament act and hence cannot be easily purchased / sold in the market freely. To use this technology, first license need to be procured from AERB. To establish the plant again license is required from AERB.

- The gamma ray source (Co60) is purchased from the sales & marketing arm of Nuclear Power Corporation. To transport the Co60, special vehicles are needed and considering the residual irradiation danger from these special vehicles, generally the transportation happens in the night. To reduce the transportation hazards, these plants are located close to Atomic Power Plants.
- Once the Co60 source is purchased, it continuously emits Gamma rays and hence for economical operations the manufacturing plant has to run 24 X 7 X 365 days. Any stoppage would lead to reduction in the utilisation of the Co60 source. So the plant load factor has to be very high and it is an important factor for economical operations of the plant.
- To operate the plant, important operators have to be AERB certified (very skilled and certified man-power is required).
- Due to irradiation danger, the plants need to be operated in sparsely populated areas which is close to Co60 source, where getting AERB certified operators could be an issue.

So from the above, we can conclude that cost approach is the best approach for Valuation of these Gamma Irradiation plants (unless they are running successfully, in which case income approach can

be used). Market approach cannot be used as these plants cannot be easily purchased or sold (without licenses). Since this is a restricted technology, getting comparative quotations for carrying out the valuation using cost approach is a difficult task. So we have to go with limited sources available in the market including requesting the plant owner to get the current prices of all the plant and machinery items.

CONCLUSIONS:

This is a very restricted technology and hence before carrying out the valuation of the plant, it is absolutely essential to note as to what all plant and machinery items are going inside the plant, understand the technology and also understand the market potential and then carry out the valuation in an informed way.

