

# THE SUMMARY OF COST CONTROL IN PRODUCTION PROCESS OF BRINE PURIFICATION

Sheng YU

JiangXi Salt Co. Ltd. Zhangshu, Jiangxi

**Abstract:** This paper summarizes how to reduce the production cost of brine purification process in Jiangxi Salt Co., Ltd. after the 300,000 tons of salt sodium sulfate co-production in operation. The economic efficiency is increased through a large number of technological innovations, and continuously optimizing the product process.

**Key words:** brine purification, cost control, summary

## 1. INTRODUCTION

The brine purification process in Jiangxi Salt Co. Ltd. has the production capacity of 300,000 tons of refined salt, 20,000 tons of anhydrous mirabilite supporting cogeneration in one year. It plays two purposes: firstly, reduce the content of calcium and magnesium through adding lime and soda in the brine solution; secondly, prevent the scaling in production device to ensure the effective production time and lower energy consumption. The entire device was completed and put into production in May 1996 and achieved production targets quickly. However, according to the year-on-year calculation of 300,000 tons of salt by sodium sulfate early co-production to the 100,000 tons vacuum salt production cost, the cost of 300,000 tons of salt and sodium salt co-production increased 135yuan each ton than the past due to the addition of brine purification device. To reduce the cost of production cost and enhance the competitiveness of enterprises, how to digest the cost of new device is the key factor. For brine purification process, the production cost can be reduced only by strengthening management constantly and developing potential energy in order to increase economic efficiency. From the initial operation, enterprises grasp on the work-oriented accurately, so in recent years

the production costs decline substantially through effective management and technology research, and production and management is also to a new level every year. As for me, I only summed up a series of cost management and technological innovation in brine purification process in order to lower production costs over the past few years

## 2. THE COST CONTROL CONTENT OF BRINE PURIFICATION

The salt company cost include: direct manufacturing costs, marketing costs, financial costs and other cost-sharing. For the Brine purification process in my company, it only involves the direct manufacturing costs. If we continue to breakdown, it also includes six areas which are the followings: raw and auxiliary materials procurement, warehousing and the actual cost (including lime, soda ash, coagulant), raw and auxiliary materials haulage, running power injection, soil calcium and magnesium transporter, money digging force funding equipment maintenance costs, the production of the necessary utilities and staff salaries, bonuses

### **3. THE COST CONTROL METHOD IN BRINE PURIFICATION**

#### **3.1 establish an effective cost control system**

Cost management and quality management are two major and closely related activities in enterprise management, which are opposite side and are united in a whole. Only by combining both organically can create benefits for enterprises. In early 1998, with the starting of ISO9000 quality system certification, the company gradually began to establish an integrated complete management system combined cost control and quality management in the whole enterprise, which allows all staff to clearly understand their responsibilities and to perform their duties. At the beginning every year, the planned targets are input into the internal operation contract which is signed with the units and the cost management is assessed; The situation is adjusted next year according to the completion last year. Effective management must be dependent on effective supervision. jingXi Salt Co. Ltd. passed the ISO9000 quality system certification in 2000. In order to maintain the effective function of the system, the company also established effective monitoring, inspection and incentive mechanism; and based on "code of conduct" requirement, a series of major reforms are carried out, such as in-house reductions to improve efficiency, streamline in institutions. At the same time, closed-end management, electronic credit card attendance, as well as the monthly equipment management rating are implemented successfully and also play an important role on the effective function of the system and cost control. Since the system establishment in 1998, the production cost has been dropped; the production and management record has been higher year after year; production profits has been increased yearly and the product quality meet even exceed national standards. Comparing the cost per ton in 1996 that 300,000 tons production is in the initial, data shows that 5 percentage points are reduced in 2001 and 3 percentage points are reduced in 2002, which includes the extra two million yuan for coal prices rising at the beginning of this year.

#### **3.2 Refine brine purification cost and carry out effective management**

Based on the sound effective cost control system, reducing the cost of brine purification process is to refine the whole cost consumption and identify the key factors impacting the brine purification cost according to the actual production. Analyzing the six elements which are related to brine purification cost, we can see that the staff salaries and bonuses are a set, not in the list of cost control. The Other five areas are the followings according to the proportion in total cost: raw and auxiliary materials, including soda ash about 4500 tons per year; followed by the power consumption; equipment maintenance; external funding. After years of production practice, we sum up three important production experiences in control brine purification costs: Firstly, enhance the quality awareness, increase production efficiency and reduce the raw material costs based on soda ash and lime; Secondly, continuously conduct technical research, and optimize the production process, so as to lower the equipment operating cost. For the power consumption generated by the equipment operating, there is not much drop as long as no waste by human being on the view of appearance. However, it is a surprise from the process optimization and technological innovation potential points. Thirdly, the daily and overhaul cost of equipment maintenance. It is a long-term and systematic project to lower the cost of this area. Experience has shown that doing the required daily equipment maintenance and improving equipment management level can be largely extended the equipment life cycle, which is a kind of invisible saving. Meanwhile, decline can be seen only comparing the annual repair cost.

##### **3.2.1 Enhance quality awareness and improve production efficiency**

Practice shows that every quality remedy, every testing data and standards improving one ppm will add to costs. And thus to reduce and control the cost of raw and auxiliary materials is to enhance the quality of production, improve production efficiency and reduce unnecessary waste, which can be controlled by following three aspects:



### **3.2.1.1 Enhancing quality awareness, improve the accuracy of test results**

The certificate of analyzing calcium and magnesium ion in brine often appeared 0PPM. This is mostly due to the large original error detection of halogen, which results in excessive use of raw and auxiliary materials. If calculating the error by one PPM, approximately extra one ton soda ash should be put in at one time, which causes cost of waste is 600,000 yuan for nearly one year. For this reason, an accurate error rate to one PPM is required for the analyzer. Each test sample is required to label the time and the analyzers' name. It will store for three days for check or sampling of the functional departments. Test accuracy of analyzer is linked to bonuses. The implementation of this rule greatly enhanced the test accuracy and inaccurate test causing production errors and cost waste is rare in production.

### **3.2.1.2 Increasing production efficiency is to reduce production costs**

By statistical calculation, the time and the cost to deal with the failure halogen is almost the same as producing a batch of halogen for each quality remedy, which does not include the effect that the quality problem has on the final product and devices after reworking. In order to reduce the production cost and improve working efficiency, branch plant carried out the "zero defect" process: do a good job once. In production practice, it is purified brine successfully at one time and to ensure that the pass rate of refined brine batches is up to 99 percent. At the same time, labor activities also run between the four teams on the theme reducing cost rate. Though comparing the average cost of raw and auxiliary materials with the early yearly plan in the four teams, the team which lower the cost largest is the advanced team the same month and is rewarded 100yuan. In the end of the year the branch will award the largest decline team in the annual distribution to the advanced team to encourage the enthusiasm of staff, and to continuously enhance the cost-conscious to employees. Through the above way, control the cost of brine production in all aspects is controlled well and eliminate the waste. Since beginning production, for one cubic

meter original brine, the lime consumption is dropped down to 0.48Kg in 2002 from 0.6Kg in 1996, decreasing by 20%. The soda ash is dropped down from 3.9Kg in 1996 to 1.9Kg in 2002, decreasing by 51.2%.

### **3.2.1.3 Enhance storage management, reduce raw material inventory loss**

The quality of raw and auxiliary materials is not only related to the fine quality of brine, but also directly impact the cost of production control. Therefore it is also critical to reduce the brine purification cost to strengthen the storage management, to prevent raw and auxiliary materials deteriorations and to reduce the inventory loss. In accordance with ISO9000 quality system requirements for warehouse management, the company not only supplies the ongoing training for warehouse custodian, but also establishes a set of effective warehouse management: carry out strict quality enforcement for the raw materials into the warehouse and follow the principle of FIFO for the use. At the same time, according to the storage conditions of raw and auxiliary materials, the hardware facilities is strengthened and improved. The loss rate of storage for damp, deterioration, broken packages of raw and auxiliary materials from 4% a few years ago is drop down to 1% of the current. In the past, there had been a result of the quality of raw materials led to the phenomenon of excessive halogen fine and now it is even disappear.

### **3.3 take continuous technical research and optimize the process to achieve the purpose of reducing costs.**

In series of technological improvements and process optimization on brine purification, to control and lower costs mainly refer to the following aspects: First, reduce the labor intensity and improve the work efficiency. During the early production, there are eight persons working in the process. Because of equipment and process factors, the staff are inadequate when muding pump, filtering and switching to brine at the same time. There are two main reasons. First, there are too many use of ball valve in the whole process. They are not opened due to

the corrosion, as a result increasing labor and production costs; in particular those diameters are more than 300MM and usually require three employees to work together to open. Second, sludge system is imperfect making several people to participate in sludge every time. Through series of transformation, process is optimized and labor force is reduced significantly although the process members are dropped down to 6 persons and acid and calcium and magnesium plus killing device are introduced.

Because the pumps in two dissolved tanks for purification of brine are easy to block during the delivering and to avoid effecting production when one pump is repairing, in 1997 we selected a new type pump and rebuilt the two pumps linkage. Afterwards, the pump blocking phenomenon is resolved and the feed efficiency is improved too.

In July 1997, in order to solve trouble that the sludge system does not work well in stead of manual excavation and the following costs and environmental pollution, we take some technological transformation on the mixing device of the two reactors. Finally the sludge can work and mud can reach the tank as well. Only the savings of the abolition of manual excavation soil calcium and magnesium is up to 60,000yuan a year.

In 1999, aiming at solving the severe corrosion of the salt production facilities caused by subalkalic fine halogen, a set of proof acid devices is introduced after some adoption. According to the pH value of fine halogen, acid is added to counteract. In the end, fine halogen PH value is stable.

After years of practice, in 2001 we rebuilt the brine recycle system combining the function of recycle and slurry feed pump and abolishing two processing pumps for the recycle and feeding. Only the savings of power consumption on the two pumps are 80,000yuan a year.

At present, the development of the secondary, calcium and magnesium clay is slow, the first level of calcium and magnesium clay has no development and utilization value, and open-air dumps pollute the environment. To reduce the environmental pollution caused by mud as early as possible, and to reduce calcium and

magnesium mud filtering, stacking and transit fees, we finally come up with a comprehensive technical program after the branch factory got a meticulous achievement on magnesium conducted of calcium mud, which is based on the repeatedly argued decisive by company functional department and managers decision-making. Through a series of technological transformation, production costs can be reduced for more than 200,000yuan in one year.

By constantly technological innovation and the brine purification process optimization, we reduced not only the production costs, but also the operating time of equipment increasing the production efficiency, which is one of the main action to reduce the production cost.

#### **4. CAUTIONS OF COST CONTROL IN BRINE PURIFICATION**

Cost control is an important activity carried out by many business leaders. In terms of the cost control on the brine purification, whether the activity can achieve the intended purpose or not should noted from the overall situation in mind to prevent the isolated consideration of cost control. For example, such as salt, salt and sodium, power, mining, packaging etc., these workshops are often managed separately. To lower costs, if all branches are confined to the unit to reduce costs, it can not reduce the cost, but would increase the cost of the product finally. For instance, fine halogen is often out of specification. If quality remedy is not carried out, it may shorten the production cycle and increase the washing numbers for the equipment, thereby raising the cost of production. Therefore the company has calculated the costs and benefits combined workshops together a long time before. All the employees reached a consensus that lowering product costs does not at the costs of the quality of product. In fact, increasing the cost of some units has played a key role on lowering the whole cost. So in terms of cost control activities, we must make a full consideration.

#### **5. CONCLUSION**

Based on cost control, production management which realizes forecast, plan,



control, cost analyses is a comprehensive reflection of the management level. At present, the management of brine purification in Jiangxi Salt Co. Ltd. is based on grass-roots level, which requires all grass-roots level staff to strengthen the cost concept, and be responsible for the profit and loss of production. The production management level is reflected in all aspects of production management, which requires strengthening all aspects management. It also requires sharing the information in all business management, comparing with the

actual operations, strengthen cost analysis, finding out the root reasons for unusual profit and loss in time and taking actions.

In short, the brine purification process is a dynamic process of inputs and outputs. Only taking full advantage of modern cost control methods and comprehensively, timely, accurately, and effectively control construction costs can maximize profits and minimize costs to improve social and economic benefits of salt business