Chapter V

Proposed feasible method for coal fired thermal power plant using NH_3/NaClO scrubbing

5.1. Proposed outline of this process

As the efficient results observed in simultaneous absorption of SO_2 and NO, this process can be used to treat coal-fired thermal power plant stack gases. Even though removal efficiency drop was found in the spray column, the results are still strong enough to design a pilot plant for the process. There might be difficulties in consideration of effective operating parameters such as the flow rate of the gas, concentrations of flue gas stream, available temperature range of flue gas stream, etc. The optimum time discussed in the process was suitable for given absorption column, but in large scale operations the optimum time might be reduced to

maintain optimum operating cost. The pilot plant should be quite like that of spray column setup as shown in Figure 4.3 in results and discussions.

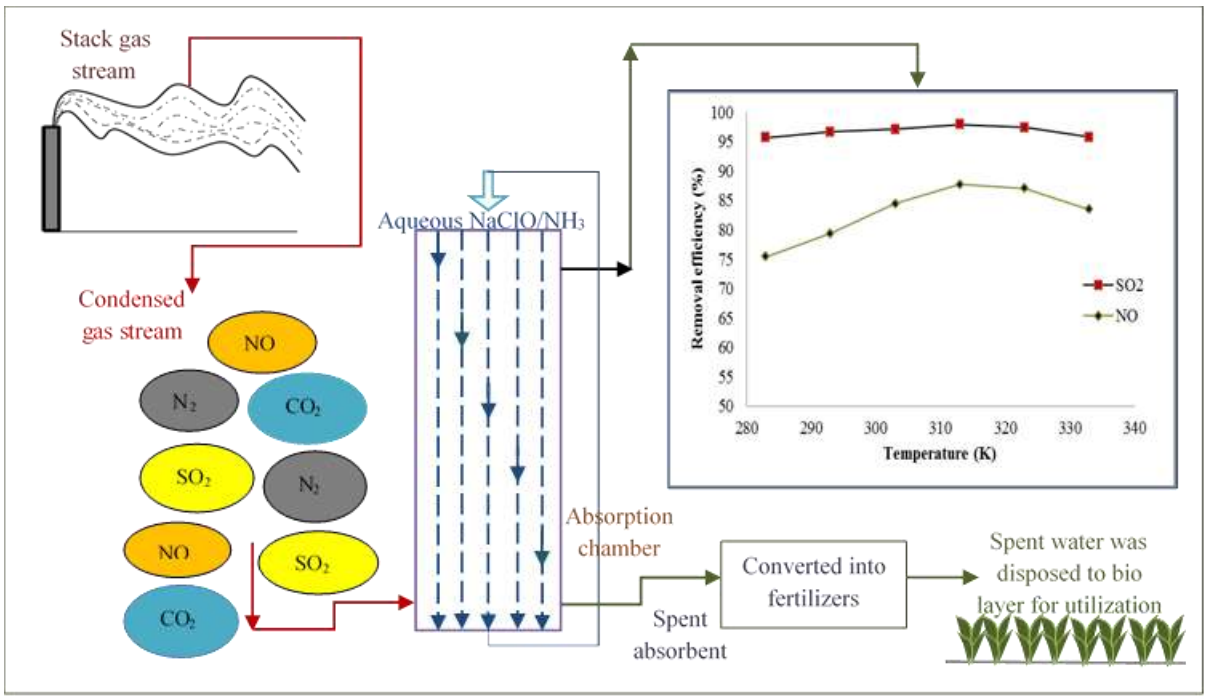

Figure 5.1. Proposed outline for simultaneous absorption of SO_2 and NO in coal fired thermal power plant by NH_3/NaClO scrubbing

As the exit flue gas was initially compressed and cooled down to reach operating temperature and sent to absorption column, the process should be maintained in such a way that the absorbent must remove even CO_2 besides SO_2 and NO as ammonia solution was capable of absorbing CO_2. The spent absorbent solution can be sent to crystallization process to collect the fertilizers useful for agricultural purpose. The combined mixture can be directly used to

plants. The water remained after drained off can be utilized in to bio layer around the power plant so that they can absorb the available fertilizers to their growth. The influencing parameters can be heat exchanger performance, electricity requirement in compressing and cooling of flue gas, and energy losses during the process. The final proposed outline of the process which can be implemented on thermal power plant was given in Figure 5.1.

5.2. Proposed bio layer around the power plants

The main intention for preparation of bio layer is to reduce the contamination in water body and groundwater. By converting the toxic gasses in to useful fertilizers must effectively reduce the contamination in water but it may contain minute amount of fertilizers and direct discharge of it can cause harmful effects to environment. A bio layer must be prepared around the power plant so that plants/trees can utilize the remnants of nitrates, sulphates and carbonates present in discharged liquid from crystallization process. It has the prospects for countries like India, as in India several cultivations have been done for paper pulp industry and artificial coal industry. In India, the plant named “Survey (it is a type of Pine tree)” is cultivated in coastal areas. This consumes less amount of water and it is used for paper and pulp industry. The total cultivation time of these plants is around 4 years. So, these plants can be used as bio layers around the power plants. The traditional cultivation techniques may be used for this plant growth. The proposed view of bio layer around the power plant was shown in Figure 5.2. Every power plant might contain 50 to 100 square meter free space throughout its boundary. The free space around it can be utilized for preparation of bio layers. The available free space was proposed to divide into 10 to 16 parts leaving the transportation

spaces. Each part will be built into 10-layer soil beds separated with water canals starting from power plant side. These soil beds should be maintained with 2 meters width at the top, 4 meters at the bottom and the water cannel should be maintained at 1 meter in the bottom.

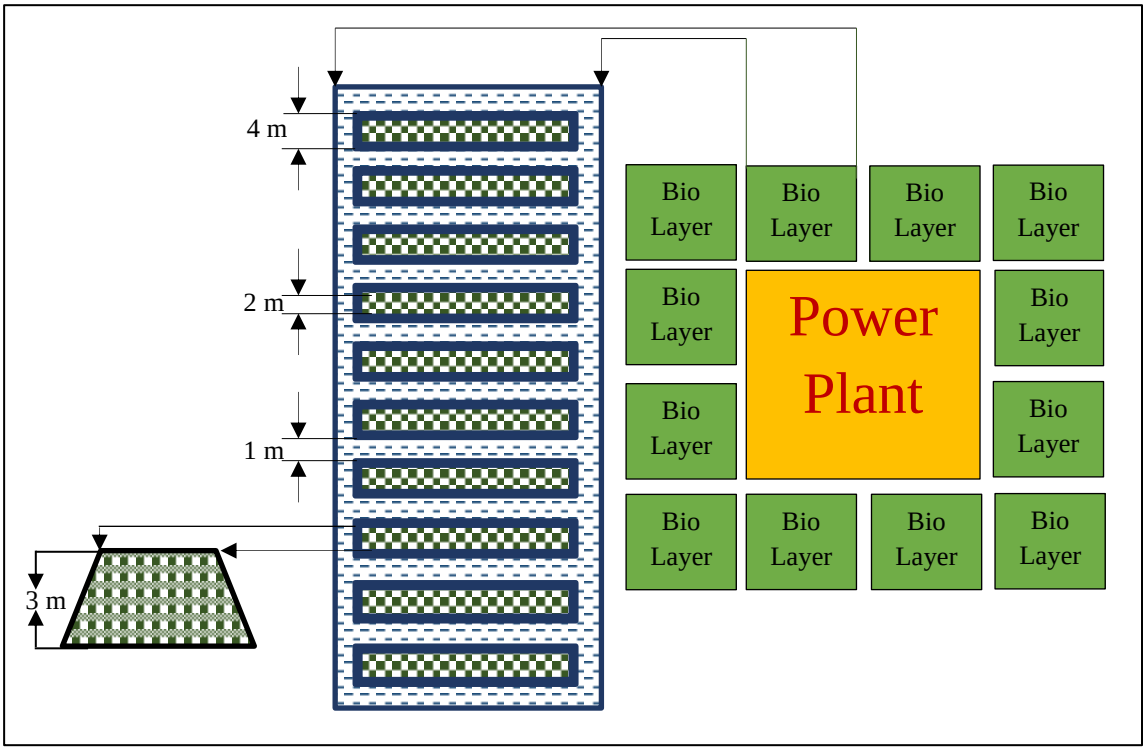

Figure 5.2. Proposed view of bio layer around the power plants

The bed should be in the shape of trapezoidal with height 3 meter from ground level. Each bed is cultivated with the Survey (Pine) plants at both corners and the normal distance between the plants is 1.5 meter. The layers should be maintained in such a way that it is divided in to four parts followed by ¼ of them must be removed and re-cultivated every year.

This helps ¾th of bio layer always kept alive and be profitable every year. These layers help to reduce the surrounding temperature, gain profit, purify discharge water, and improve the ground water level.