

## COMPLETION REPORT

### **Hazardous Solid and Waste Water Management: Case Study between Research Kyoto University, Osaka University, and Campus Indonesian Institute of Sciences (LIPI) Bandung**

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Organic and inorganic wastes derived from daily activities in Campus of Indonesian Institute of Sciences (LIPI) Bandung have not well managed yet. Office waste are mixed and discarded in a temporary open dump site will be taken by other parties periodically. On the other hand, wastes from laboratories are stored in used containers. There is no particular space to keep these containers. Campus LIPI Bandung is not yet equipped with proper and adequate for organic and non-organic waste management facilities. The number of container is increasing over time. due to the awareness of waste management. Due to the awareness of waste management is importance, comparative study was carried out with other parties. Osaka University and Kyoto University was selected as our partners. Osaka University was represented by Research Center for Environmental Preservation, Suita Campus, whereas Kyoto University was represented by Research Institution for Sustainable Humanosphere (RISH), Uji Campus.

Prof. Ikuya Shibata, Associate Prof. Dr. Shinji Tsunoi, and Assistant Prof. Dr. Itaru Suzuki from Osaka University explained in detail about the waste management. Osaka University strictly carries out the waste management based on the regulation published in Safety Manual which is renewed annually. Any wastes from laboratories were kept in containers with a certain code based on its classification, for instance yellow sign for polar used solvent such as methanol, ethanol, acetone, tetrahydrofuran, dimethyl-formamide and etc. Red color sigh for non-polar used solvent such as benzene, toluene, hexsane, and ethylacetate whereas the black sign for halogen such as chloroform, di/trichloromethane, and etc. On the other hand, container without any sign for ether, pentane, acetaldehyde, and carbondisulfide. This regulation is well understood by all the residence of Osaka University. In addition to internal regulation, these wastes management is also under controlled by the local government. The containers full of wastes were collected and stored in a temporary building and will be taken up by the third party. Picking up schedule for the containers has been decided at least one month in advanced. At the picking day, students and their professors seriously involved in this activity. The existing IPAL in Osaka University is no more operated since it is costly for its daily treatment process. Prior to its use and disposal, all chemicals are registered through the system called as Osaka University Chemicals Communication System (OCCS).

Similarly, Kyoto University managed the hazardous wastes based on regulation mentioned in the manual of which well understood by all the residence. Ass. Prof. Kenji Umemura from RISH described how does the waste separated based on the classification. The classification of wastes is of general industrial wastes (e.g. paper, flammable garbage, food waste, empty bottle, empty can), ordinarily industrial waste (scrap metal, waste plastic, waste wood, concrete), and specially controlled industrial wastes (unnecessary chemical, inorganic liquid waste, asbestos-containing material). Kyoto University collaborates with private company to pick up the waste regularly. The university impost a system to register and list the purchased chemicals, its remaining and its disposal. The system is known as Kyoto University Chemicals Register System (KUCRS)

Discussions with research groups in LIPI Bandung, Cibinong, and Serpong were carried out to share the knowledge of waste management in Japan Universities. Several suggestions were proposed to the Campus LIPI organizer such as to (1) introduce good waste management practice (2) provides trash bins facility for waste separation, (3) provides containers for organic and inorganic wastes, (4) establish temporary storage building to keep containers for wastes, and (5) collaborate with other parties or private companies to handle the hazardous solid as well liquid wastes.

Organic and inorganic wastes in Research Center for Chemistry-LIPI, Research Center for Biotechnology-LIPI Cibinong, as well as Research Center for Biology in Cibinong were sent to the private company. The temporary building to keep the waste is available in these research institutes. On the other hand, organic and inorganic wastes in Research Center for Biomaterial LIPI Cibinong and Research Center for Physics in Serpong are kept in containers and collected in

an unused room. Besides, informal discussion on the Japanese Waste Management was also carried out with colleagues in scientific professional association.

Good waste management system based on this experience is freely discussed or suggested for those who required the related information. Small model for organic waste treatment was established in Research Unit for Clean Technology. Book manuscript entitled Safety Manual as a guide for researchers and technicians working in laboratory is published.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)