

## **Educating Volunteers, Stakeholders, and Workers Use of Input-Output Analysis Graphics at Savannah River Site (SRS) -- 10331**

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### **ABSTRACT**

Stakeholders and the public face a steep learning curve when trying to understand a macro view of what is happening at many sites generating waste. Input-Output Analysis presented graphically can help in this process. The goal of this paper is to use the CAB SRS Process Overview Chart to demonstrate how such a tool can be developed and used by any waste generating site to better educate stakeholders, the public and even workers on site processes and how they inter-relate. The paper will briefly discuss procedures for updating the resulting graphic and its use at every CAB and CAB Committee meeting.

### **Educating Volunteers and Stakeholders**

The Department of Energy (DOE) Office of Environmental Management (EM) established the SRS site-specific advisory board (SSAB) in 1994. The aim was to improve cleanup decisions by reflecting priorities and concerns of stakeholders. The SRS SSAB was formed as the CAB. There are 25 CAB members and as many as a dozen of these may be in their first year of membership. Each member must participate in one of the four committees that deal with SRS internal operations.

These are The Nuclear Materials Committee, the Waste Management Committee, the Facilities Disposition and Site Remediation Committee, and the Strategic and Legacy Management Committee. Members of the public and stakeholders may participate in committee work and may attend full CAB meetings. Although the whole CAB meets every other month, each committee may meet as often as twice between CAB meetings and the vast majority of the CAB work gets done at these committee meetings. An individual CAB member might only be attending one of the individual committee work sessions. Because this limits an individual to only one aspect of a much bigger problem, there was a need for something that would allow the membership to come to a better understanding of how the work monitored by each individual committee related to the work of the other committees.

Also, the committees and board depend upon briefings from DOE, federal and state regulators, and private contractors. Informed participation by the CAB membership, the general public and other stakeholders is dependant upon understanding the processes that are being briefed. These briefings often contain highly technical information. Often, the only thing these briefings have in common is that each contains a list of acronyms and many busy and complicated wiring diagrams and flow charts. Seldom are the acronyms and diagrams similar and even when the same subject is briefed again (perhaps a few months later), the diagram may have changed. Figures 1, 2, and 3 (on the preceding pages) are shown as examples of how detailed some of these presentations can be. Later, these figures will be put in context using the Savannah River Site Waste and Material



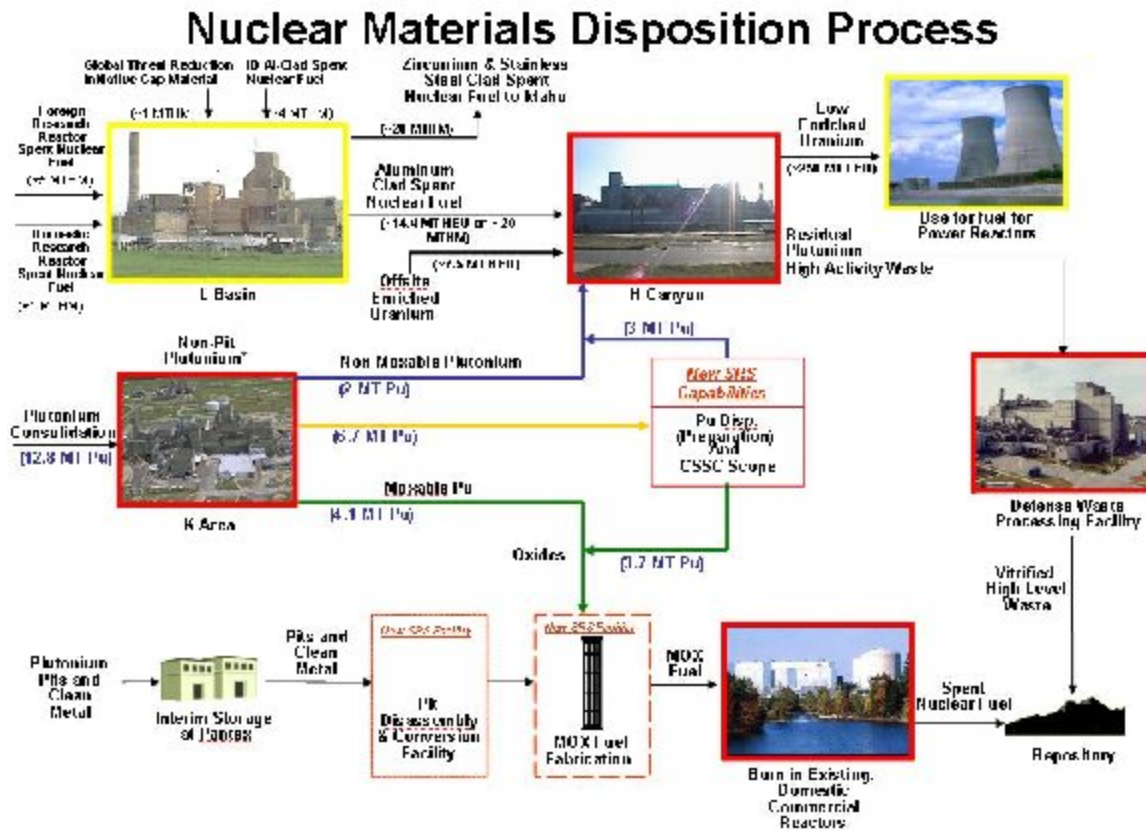


Figure 2

sanitary, hazardous, mixed, low level, transuranic and high level (PROCESS). It disposes of some of this waste on-site and ships others off-site (OUTPUT).

By design, many of the CAB members do not have a technical background. This is often true of the interested general public and many stakeholders. CAB members are restricted to six years on the board. This time restriction and the CAB committee structure makes it possible for someone to reach their final year of membership without understanding the full extent of all the processes occurring at SRS with their attendant inputs and outputs and how they relate to one another. Such a synoptic understanding is essential to making informed decisions concerning the recommendations (over 260 to date) which the CAB makes to SRS management. Also, efforts at public outreach are challenged by the long length of time it takes to grow a foundation of knowledge necessary for informed involvement.

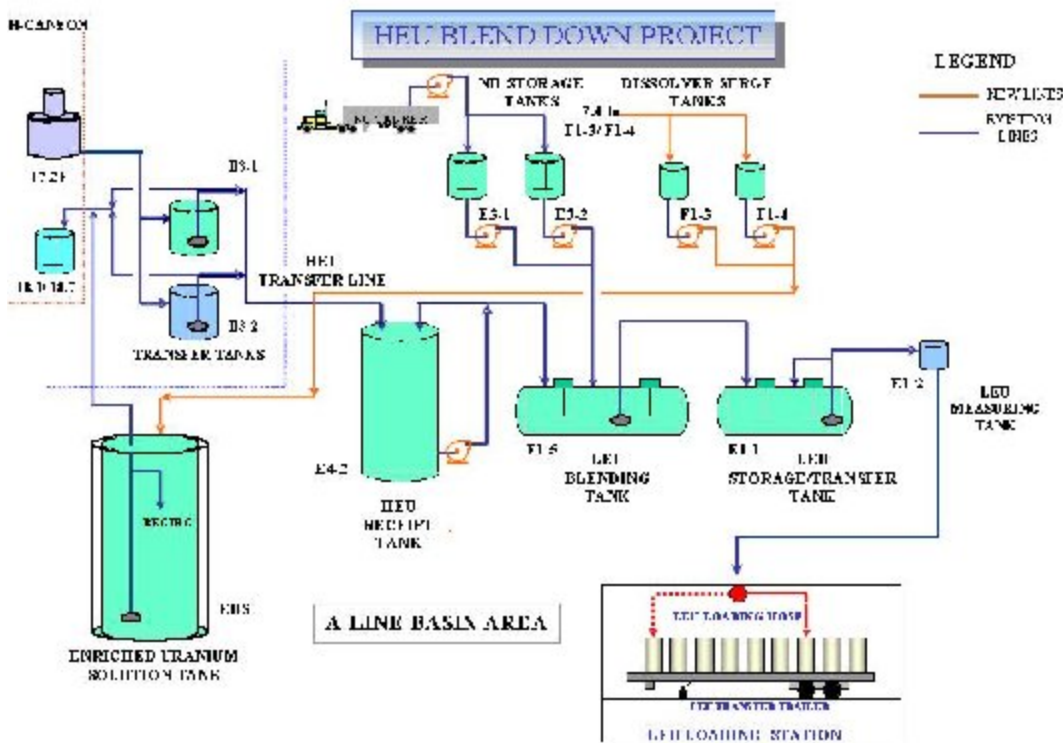


Figure 3

In 2008 members of the CAB conceived the idea that the development of a CAB SRS Process Overview Chart might be a worthwhile effort. Such a chart could be useful in educating and informing members, the public, stakeholders, and workers on the varied processes occurring at SRS and how they inter-relate.

The initial inspiration for this effort was in the understanding of complex systems which can be attained by Input-Output Analysis. Wassily Leontief won the Nobel Prize in Economics in 1973 for his use of Input-Output Analysis in describing macro-economics.(1). Input-Output Analysis has been a tool for systems analysis and operations research for over 40 years. Without getting into the econometrics of such analysis, it is helpful to use the basic graphic structure of it's modeling. In it's simplest form Input-Output Analysis is a building block for understanding complex systems. For example(Figure 4):

**INPUT >>>→PROCESS >>>→OUTPUT**

Figure 4

To make it more specific, we can add the following (Figure 5):

**INPUT >>>→PROCESS >>>→OUTPUT**  
**SUGAR >>>→MIX/BAKE >>>→CANDY**

**Figure 5**

The model can be expanded (Figure 6):

**SOURCE >>>→INPUT >>>→PROCESS >>>→OUTPUT ...→USER**

**Figure 6**

And again, to make it more specific (Figure 7):

**SOURCE >>>→INPUT >>>→PROCESS >>>→OUTPUT>>>→USER**  
**DIXIE >>>→SUGAR >>>→MIX/BAKE >>>→CANDY >>>→SWEET**  
**CRYSTAL Co. TOOTH, Inc.**

**Figure 7**

You can get more complicated by expanding the model in either direction and creating overlays and layers. In the more complicated econometric formulas these become matrices. For example, if you looked at Dixie Crystal as a Process, perhaps the Input might be sugar cane, or if you considered Sweet Tooth as a Process, the Output might be a particular kind of candy and the User might be a candy wholesaler. Using the mathematical models you can quantify inputs and outputs and create predictions of either based on assumptions and metrics known about the processes.

However, the purpose of this paper is not to inform you of the intricacies of Input-Output Analysis. The usefulness of this approach is that you can use this process to take complex systems and break them down in such a way that you can come to a larger understanding of what is going on..

For our CAB purposes, we wanted a way to quickly bringing our members and stakeholders up to speed in understanding what was going on in that big black box called SRS (Figure 8).





figure is not presented to give any accurate portrayal of the SRS process, but only to shows the general idea of what we were trying to achieve. At this point we turned it over to one of the Savannah River Nuclear Solutions (SRNS) technical advisors to the CAB who had a comprehensive understanding of the site and who might be able to translate these ideas into a more accurate and comprehensive representation of the SRS Inputs, Processes, and Outputs.

As a result and after a few iterations between CAB members and the SRS staff, the result, in its most recent version, was Figure 10. The Legend in Figure 10 shows how you can tell by color what comes in and what goes out. The Sources and the Users are also identified. For example, in the lower left you can see that nuclear materials from “other” agencies is sometimes accepted by Savannah River National Laboratories (SRNL). In the upper right you can see that some Low-Level Waste (LLW), Mixed Waste (MW) and Hazardous Waste (HW) goes to off-site repositories.

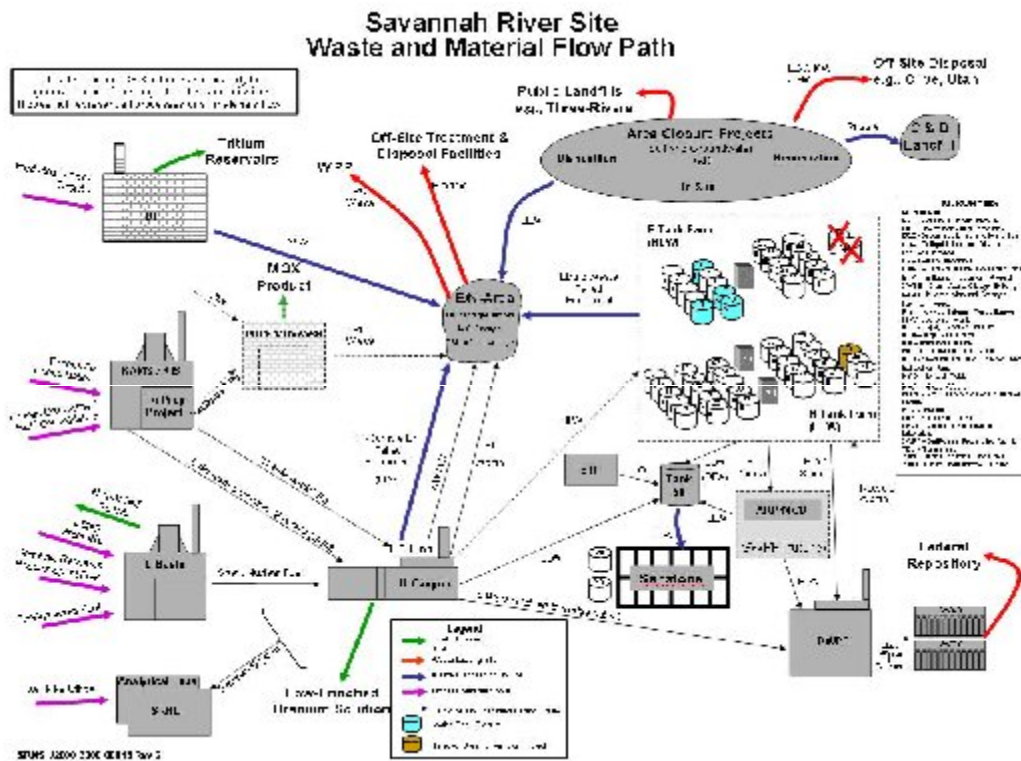
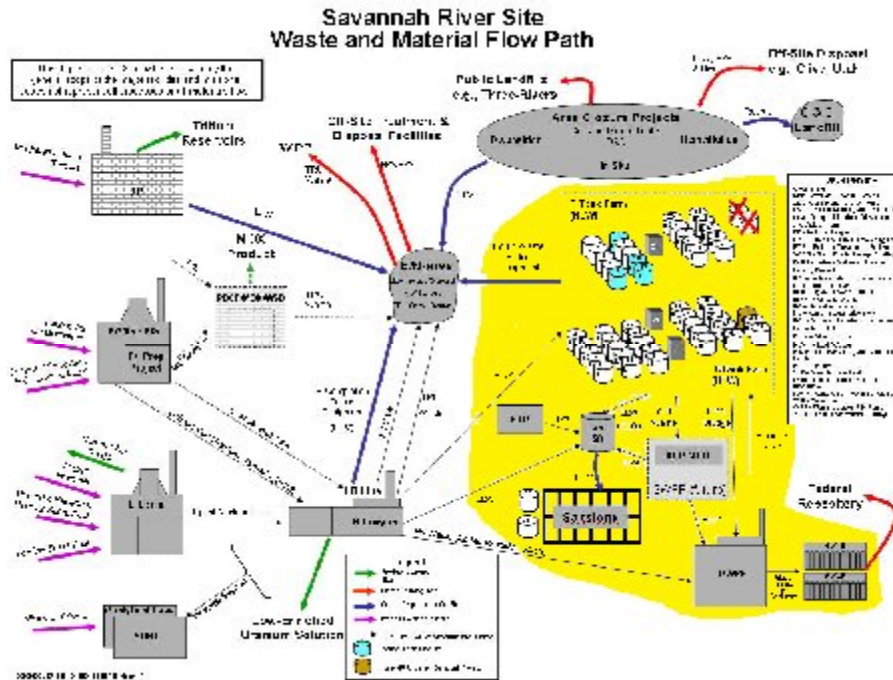


Figure 10



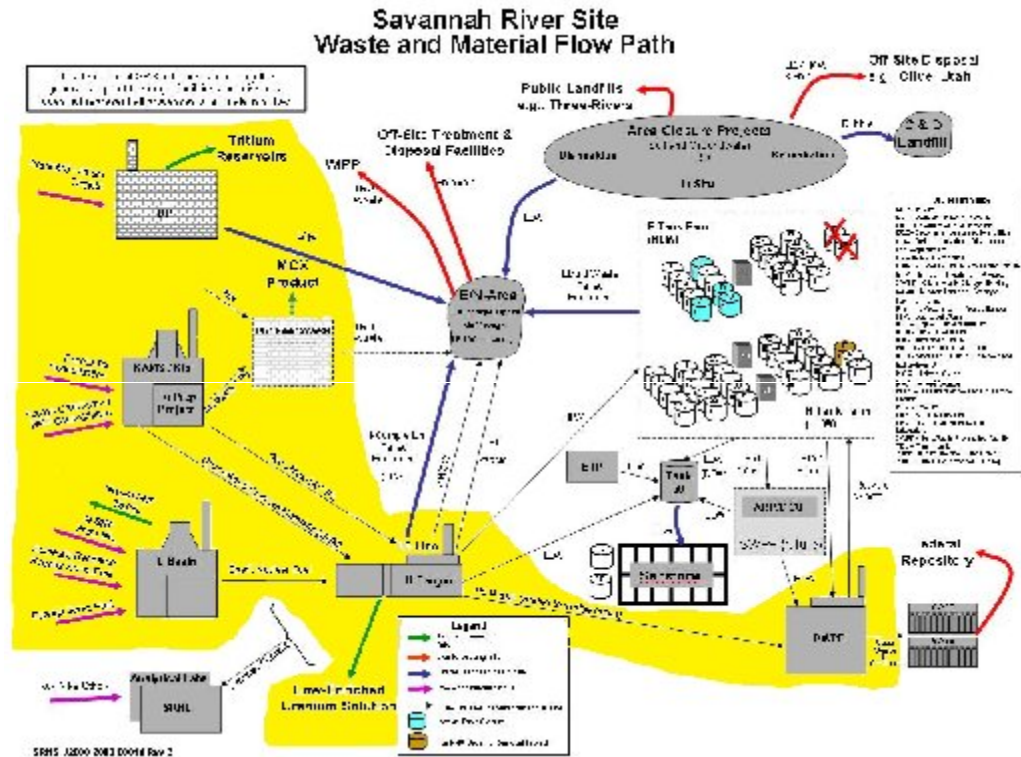
Shows Figure 1 Subject Area

Figure 11

This graphic was first presented for approval at the CAB annual Process and Education Retreat in October of 2008. After it was presented and briefed one of the new members, who had been on the board for about six months, commented: "This is what I've been waiting for." The slide allowed her and everyone else to understand the larger processes going on at the site and how they inter-relate. The slide is now presented at New Member Orientation and at virtually every committee or CAB briefing it is the first thing shown and the briefer must point out where in the big picture the briefing subject fits. For example, Figure 1 dealt with liquid waste operations and that process area is highlighted in Figure 11.

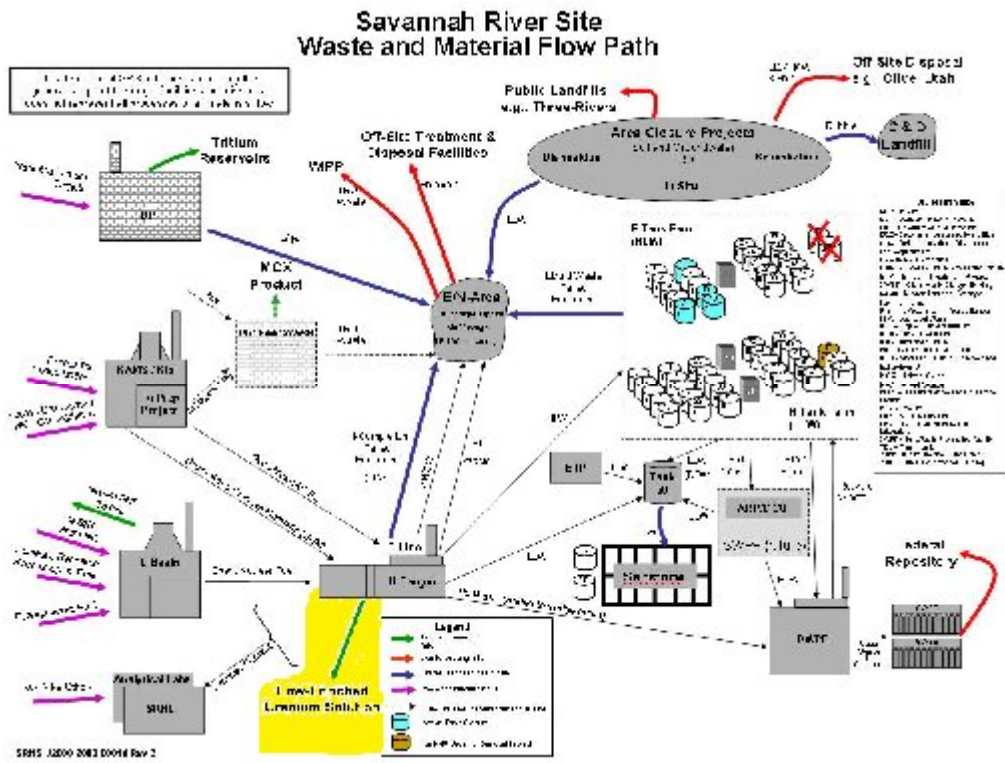
Likewise, Figures 2 and 3 dealt with nuclear materials operations and those process areas





Shows Figure 2 Subject Area

Figure 12.



## Shows Figure 3 Subject Area

### Figure 13

are highlighted in Figures 12 and 13. Note how the extreme detail depicted in Figure 3, **HEU BLEND DOWN PROJECT**, is represented by a single line in Figure 10, the CAB's **Waste and Material Flow Path**. It should be noted that the disclaimer in the upper left portion of the graphic points out that only the general scope of operations at the site are depicted in the graphic. Figures 3 and 13 are an excellent depiction of this.

### CONFIGURATION MANAGEMENT

In complex systems, such as those occurring at SRS, the processes and emphases are always changing. Because of that the CAB's **Waste and Material Flow Path** graphic is under configuration management. When it was initially presented in October 2008 there were a few suggestions to improve it resulting in Revision 1. Several more suggestions

had been made during the year resulting in Revision 2 (seen here) which was approved in November of 2009. Any change must be approved by the CAB Executive Committee which then nominates the change to the CAB Deputy Designated Federal Officer (DDFO) for final approval. The DDFO is the official CAB liaison with the site. Only after this process is complete is the CAB staff allowed to alter the graphic.

### SUMMARY

The benefits of presenting such complex data in such a simplified Input-Process-Output form has definitely benefited the CAB. It, also, has great potential for assisting public outreach by making these processes easier to understand for other stakeholders. In addition, it could be used for educating site workers who often develop a very parochial view of what it is they are doing and how it fits into other site operations.

The result of such an effort at analyzing the Inputs, Processes, and Outputs at any site can result in a better educated public and work force. It can make for more meaningful communication between the stakeholders and the site staff. Such analysis allows people to see the whole picture and understand how the micro view they are seeing fits into the macro view.

1. "The Leontief Open Production Model or Input-Output Analysis," Iris Jensen, Dec. 18, 2001.

<http://online.redwoods.cc.ca.us/instruct/darnold/laproj/fall2001/iris/lapaper.pdf>

2. Corporate Information Strategy and Management: Text and Cases; [Lynda M. Applegate](#), [F. Warren McFarlan](#), [Robert D. Austin](#), [F. Warren McFarlan](#), [Robert D.](#)

[Austin](#); McGraw-Hill; October 2005;

3. Business Process Improvement Workbook: Documentation, Analysis, Design, and Management of Business Process Improvement; [H. Harrington](#) , [K. Esseling](#), [Van Nimwegen](#); McGraw-Hill; 1997.