Dr. Googin and the Y-12 COLEX Process —
Recalling the Y-12 COLEX (column exchange) process

In 1952, the COLEX (column exchange) process was actually the brainchild of Forrest Waldrop who had the original idea of converting the horizontal ELEX (electrical exchange) process approach to a vertical one. With the dogged determination and innovative solutions of Waldrop and Dr. John Googin during the laboratory and pilot phases, the COLEX approach ultimately turned out to be the process of choice for producing lithium 6, the much needed material for the hydrogen bomb.

This was just one of the many major contributions Dr. Googin and the team of Y-12 Development Division scientists continued to make during the years of what Bill Wilcox has called, "The Second Manhattan Project" at Y-12. During the implementation of the COLEX process, Dr. Googin was a constant presence in the production start up and initial operations phases. He remained close to the production process and took personal interest in the people who worked there.

The story is told of how Dr. Googin walked into the COLEX process facility and strolled along the various elements of the process listening intently and saying nothing. The operations personnel watched with wonder as he slowly made his way all the way from one wall of the building to the other. Upon reaching the end of the several rows of process equipment, he made a gesture toward a unit on the far end of the room and proceeded to tell them precisely what adjustments to make. That done, he left, confident he had resolved a sticky problem, which indeed he had.

When the Soviet's exploded their August 12, 1953, hydrogen bomb (a thermonuclear-like device), the push for Y-12 to produce lithium 6 intensified. The existing OREX (organic exchange) and ELEX (electrical exchange) processes were not up to the task. OREX, while it continued as a pilot in Building 9202 until 1954, never did prove to be an acceptable process. ELEX was just going into production in Building 9204-4 in August 1953, but the production rate was woefully inadequate for the increasing demand. ELEX continued in operation until March 16, 1956.

That is where the COLEX process came to the rescue. When Forrest Waldrop's idea was made known to Dr. Googin he realized he had seen something in the Soviet open source literature that made him believe such a process would work. He and Forrest had begun work on the laboratory version of this new idea in September 1952. So, by the time of the Soviet explosion, on August 12, 1953, they were well on the way to proving the principle of column exchange (COLEX) was a superior process to both OREX and ELEX.

John and Forrest carefully worked out the details and to everyone's surprise, the column exchange process quickly showed the potential for a several fold increase in Lithium 6 production. With the ever increasing demand for Lithium 6, resulting from the Soviet explosion, a pilot COLEX effort was quickly installed in Building 9201-2 expanding the existing laboratory scale process that was there already.

The COLEX process was installed in Buildings 9201-4 (Alpha 4) and 9201-5 (Alpha 5) as full production units. This required herculean efforts on the parts of many at Y-12. The motor generator sets that had been used for the Calutrons were required to be modified. Eight units were removed and sent to Allis-Chalmers for this modification. One of the 11-ton motor generator sets was dropped while in the process of being loaded on to a railroad flatcar, damaging the equipment, the flatcar and the floor of Building 9201-5.

Building 9201-5 was stripped of all stored equipment beginning on November 2, 1953 and was completed by November 16, 1953. Imagine doing that today! As this is being written, yet again, stored equipment is being identified, checked, and staged for removal from Building 9201-5. It won't happen in 14 days - that is for sure!

The Atomic Energy Commission moved a Field Office into Building 9723-16 on November 3, 1953. This building was originally a change house for the calutron workers and located just northwest of Building 9201-4. Now it was seeing its second use, this time as an office building.

The last Calutron cubicle (where the Calutron Girls worked) was removed from Building 9201-5 on December 9, 1953. The AEC authorized a 50% expansion of the COLEX process and Building 9201-4 was added to the plans for production COLEX processes. The number of motor generator sets to be modified was expanded to 12 units. See the plans changing as the scope of the work grew?

Building 9201-5 was converted from a calutron facility and a storage facility to a COLEX process operation in only 15 months. By January, 1955 operations were underway. The huge vertical columns replaced the horizontal trays of the ELEX process in Building 9204-4. The specially designed pumps required to move the solution of mercury and lithium were functioning as designed.

Once placed in operation, the COLEX process in Alpha 5 operated 24 hours a day, seven days a week from January 1955 to 1959 and again for a short period in 1963. The process was shut down when it was determined that Alpha 4 could supply all the needed material.

Building 9201-4 was also converted to a COLEX process building and it also operated 24 hours a day, seven days a week. However, Alpha 4 operated from June 1955 to 1963 and turned out to be the workhorse of the process. It had larger columns than those installed in Alpha 5.

Huge exhaust systems were added to both Alpha 4 and Alpha 5 in 1955. The sound of these exhaust fans could easily be heard in Oak Ridge. This is likely the sound referred to by many who recall the drone of the blades pulling the air from the two huge COLEX process buildings.

Dr. Googin in his biography must have recalled this sound but seemed to have placed it in the context of the Manhattan Project era of the 1940's. However, the calutron operations were quiet processes and could not have produced enough sound to be heard any appreciable distance.

These huge fans, however, are a different story entirely. When all the fans were running from June of 1955 to 1959, I am sure they produced enough sound to be heard across Pine Ridge and were easily heard on the upper reaches of Black Oak Ridge.

The COLEX equipment is still in Building 9201-4 today although it has been out of service since 1963. The process materials have all been removed, however, the building remains under surveillance and maintenance to preserve the integrity of the facility until it can be scheduled for clean up and demolition as a part of the Integrated Facilities Disposition Program.

The COLEX process at Y-12, the second Manhattan Project, was another successful mission accomplished but not without its difficulties. The full scope of the problems would not be known until the 1980's when the mercury discharge issue surfaced.