



From The Control Room

by Maynard Plahuta, BRMA President

SUCCESS!!

As you all know by now, the Manhattan Project National Historical Park Congressional legislation has passed and has been signed by the President.

The process of achieving this milestone has been long and arduous. The efforts of many people and organizations were instrumental in accomplishing this achievement. Certainly we recognize the unwavering efforts of our Congressional delegation. Representative Doc Hastings was unrelenting in getting the legislation through the U.S. House---his unique approach to include the Park legislation in the National Defense Authorization Act (NDAA) was a key element in having the Park authorized. And just as importantly, Senators Murray and Cantwell did “prize fighter” efforts in the Senate. Senator Murray’s actions on the Senate floor, as seen on C-Span, clearly demonstrated her adamant support.

I personally wish to thank our local “Park Team” who accompanied BRMA on this road to success. Our team partners of TRIDEC (and its lobby partner), Visit Tri-Cities, the City of Richland, and RL-DOE (Colleen French) persistently kept our long-term goal in sight. Also, a significant number of people and organizations outside the Tri-Cities provided continuous valuable support. These organizations and their leaders include the Atomic Heritage Foundation, the National Historic Preservation Trust, the National Parks Conservation Association, the communities of Oak Ridge and Los Alamos, and the Energy Community Alliance. I’m sure I have left some organization(s) out but not intentionally.

However, I continue to say the key party to this

tremendous success for Hanford is BRMA. We know, and by now most of our local community agree, that without the perseverance and forethought of the BRMA founders and its early members B Reactor would not have been preserved. B Reactor’s survival was an objective that highlighted the importance of having a landmark historical facility as part of a National Historical Park---and particularly to include Hanford in the Park. Having facilities like B Reactor available to park visitors will help them envisage the Manhattan Project history much better than documents and minor facilities. The establishment of the Manhattan Project National Historical Park, to include facilities at Hanford, Oak Ridge, and Los Alamos, is significant from a historical perspective. Fortunately this was achieved by passage of the legislation.



NOW ANOTHER IMPORTANT ASPECT OF OUR WORK BEGINS. **BRMA must be strong in its support to implement appropriate functioning of the Park.** Support to the local DOE and the National Park Service (NPS) is essential. BRMA support to NPS for technical knowledge and background will help to achieve an accurate and comprehensive account and understanding of the factual scientific and engineering basis for B operations. Likewise, BRMA is able to provide background and knowledge on the development of technology at Hanford and various historical events that occurred at Hanford. BRMA also must assist in the decision-making process during the implementation of various policies, practices, and procedures to be established during the initial start-up and continuing operation of the Park at Hanford. BRMA eagerly looks forward to these challenges. BRMA must clearly be willing to meet and work cooperatively with the NPS and DOE during this and future years.

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The B Reactor Museum Assn. meets on the 2nd Monday of each month at 7 p.m. in the Richland Public Library, 955 Northgate Drive, Richland

The Jan. 8 meeting has been cancelled. Our next meeting is Monday, Feb. 9.

BRMA Election Results

At our last meeting of 2014, on December 8, elections were held for the 2015 officers of the BRMA. The slate of candidates was submitted by the nominating committee. The only officer who chose not to run for another year was C.J. Mitchell, who withdrew due to illness. Hank Kosmata stepped in to that slot. No other potential candidates stepped forward to get on the ballot, so by unanimous vote at the meeting, the three carryovers and Hank were swept into office for 2015:

Maynard Plahuta - President
Hank Kosmata - Vice President
Del Ballard - Treasurer
Gene Weisskopf - Secretary.

Also for 2015, the Committee Chairs will continue to be held by last year's chairpersons, with one exception - John Fox agreed to chair Government Relations. The 2015 committee chairs are:

John Fox - Government Relations
Burt Pierard - Membership, History & Archives
Del Ballard - Property & Facilities;
Bob Horgos - Tour Coordinator.
Richard Romanelli - Editor of The Moderator
Missy Keeney Baker - Associate Editor of The Moderator
Gary White - Communications
Webmaster - Jim Stoffels

2014 BRMA Financial Summary

Del Ballard, BRMA Treasurer

The BRMA accounts received an appreciable increase during the past year. This increase resulted primarily from a welcomed five thousand dollar plus donation from the Roger Rohrbacher estate. Roger was a long-time BRMA member and was very knowledgeable about Hanford reactor operations.

Total income for CY 2014 was \$23,157. Total expenses were \$17,260. Financial items of note include the BRMA support toward the B Reactor 70th Anniversary event, support to NW Public Television covering Hanford history, our continued tour guide service, and our ongoing activity of selling souvenirs through a retail outlet.

BRMA gratefully acknowledges the generosity of the following donors during the 4th quarter of CY 2014:

Gary Fetterolf	William L. Galligan
Jim & LaVina Hagan	Maureen Hamilton
Bob Horgos	Tom Matthews
Don Meyers	Maynard Plahuta
Everett Weakley	Gene Woodruff

Membership Report By Burt Pierard, Membership Chair

2015 BRMA MEMBERSHIP DUES ARE NOW DUE. Forty-three individuals and one organization, Los Alamos Historical Society, have taken advantage of the 4th Quarter 2014 early renewal period, giving us a solid jumpstart for 2015. Anyone who has paid and not

received their 2015 Membership Card yet, should receive it by snail mail soon.

To send in your Renewal, the Form is on this page to Clip or Print.



2015 Renewal and New Member Application

Name: _____ Date: _____

Address: _____ City: _____ State: ____ Zip: _____

Phone: (h): (____) _____ (w): (____) _____ MSIN address: _____
 (current Hanford employees)

E-mail: _____

- Individual (\$20) or Senior (age 65+) or Student (\$10) and New or Renewal
 Organization (\$25 up to 100 members; please add \$10 for each additional 100 members)

For Organization Membership, Official Representative: _____

Additional tax deductible contribution: \$ _____ Total Enclosed: \$ _____
 (Tax ID # 94-3142387) (Please make check out to BRMA)

Thank you; please mail this application with payment to: **B Reactor Museum Association**
PO Box 1531
Richland, WA 99352

From the Control Room (cont'd)

(Continued from page 1)

The authorizing legislation clearly specifies that public participation is intended to play a significant role in the establishment and implementation of the Park. It provides that local DOE site offices and communities be actively involved in the development of the general management plan identified in the Act, and to actively participate before any agreement under the Act is executed. Hopefully DOE Headquarters clearly understands these provisions and allows the unique aspects and features of each of the three sites to be considered and recognized. One size doesn't fit all. It is intended and expected that DOE Headquarters shall permit site offices to actively participate in developing the overall management plan described in the Act, and to make local/regional decisions without excessive Headquarters dictates and control. BRMA and the local communities must ensure that DOE Headquarters adheres to these provisions.

BRMA wishes to express sincere thanks to Bob Bowersock for his years of service as Chair of BRMA's Governmental Affairs Committee. Bob, I hope your

decision not to seek reelection will not deter you from continuing to be an active member and attend our regular meetings. We wish you the very best. To fill that position BRMA welcomes John Fox's willingness to accept the nomination to the Governmental Affairs Committee Chair position and become its Chair by acclamation. Likewise, BRMA is fortunate to have Hank Kosmata become its Vice President. We wish past Vice President CJ Mitchell the best of health in 2015 and thank him for his unfailing support to BRMA these past many years. And to the rest of this year's officers and committee chairs I thank you for your willingness to serve and look forward to a successful New Year.

To all members far and wide I extend my best wishes for a successful and Happy New Year. For BRMA I anticipate much excitement and a lot of hard but interesting work for us in 2015. Please be willing to provide help, or step up to give any assistance that may be requested. You don't have to be an officer or committee chair to help. Come forth with your ideas and ways to meet our challenges, help us accomplish our increased work load, and improve our operations during this upcoming year.

Author Pierard Elaborates On "Mysterious Event" Article By Burt Pierard, BRMA Historian

We received two Letters to the Editor from BRMA members in response to my "Mysterious Event" article in the Fall *Moderator*. Neither letter challenged my basic premise (that the scientists were not baffled) but both criticized the omission of any mention of DuPont's Dale Babcock involvement. In my defense, I am unaware of any mention of Babcock, by name, in any of the popular historic accounts of the Startup (including the Richard Rhodes account in "The Making of The Atomic Bomb" which I heavily relied on). Thus, to be honest, I had never heard of him.

Rhodes acknowledged his errors of omission in his Keynote Address for the 60th Anniversary Celebration of the Startup in 2004. He stated that "I researched it through mostly secondary sources to write about it, rather briefly, in my book ... (I would have written more, but I simply didn't have room, so I treated plutonium production to some extent as a black box ...)" but still no mention of Babcock. As we shall see, Babcock's role in the Startup was rather minor but his work (with John Wheeler) on the reactor re-design in 1943 was critical, so to speak. Apparently, his name only appears in his own writings and interview.

One of the letter writers, Ben Johnson, produced a copy of a 1981 Babcock letter which fills in many of the gaps in Rhodes' account of the aftermath of the shutdowns. The letter (Babcock's) also pointed to Babcock's 1964 article in

the "Nuclear News" magazine, titled "The Discovery of Xenon-135 as a Reactor Poison." I purchased a reprint (and permission to use) of this excellently researched article. Several of his footnote citations identified documents that were still classified Secret at that time and I plan to follow those leads to primary resource my files. This article is, in my opinion, probably the most accurate and authoritative account of the discovery of the Fission Product poison and the early work that lead to the 1943 reactor re-design.

The remainder of this article is a compilation of Babcock's article & letter, verbal & electronic communications with Russ Fabre, and Rhodes' book, unless otherwise indicated. To identify the players (at the time of the Startup), Crawford Greenewalt was the Director of the Wilmington Technical Division (George Graves, Asst. Director) and Dale Babcock was the Supervisor of the Reactor Physics, Control, and Safety Group. John Wheeler, Chas Wendt and Paul Gast were principal members of Babcock's Group. Princeton Professor John Wheeler was originally attached to the Met Lab in Chicago in the Spring of 1942.

During the CP-1 design process, Wheeler was concerned about Fission Product poisoning and wrote memos in February & April on the subject, namely concerning ways to increase reactor reactivity (neutron multiplication). Enrico

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REACH Schedules New Exhibits, Education Programs

By Stephanie Button, REACH Curator of Exhibits

The REACH Museum is off and running for 2015. We have five new exhibits to come in the following months as well as several exciting education programs to look for.

To celebrate the passing of the Manhattan Project National Historic Park legislation, for our adult education and 2015 tour schedule we are offering tours that will take people up the Columbia River by Jet Boat to experience the Hanford Reach National Monument, learn about the history of the Hanford Reach, and see B-Reactor from the river. These tours start at the REACH Museum with a lecture about B Reactor from a B Reactor expert. Participants will enjoy a fabulous lunch on board the jet boat as it drifts down the Columbia. The first excursion will take place on June 20th and the second on August 22nd. Tours last approximately 7 hours. To learn more about the complete tour schedule, please visit our website www.visitthereach.org. Reservations and tickets can be acquired by calling Kris Cargile at (509) 943-4100 ext. 108.

To commemorate the first-year anniversary of the REACH in July 2015, the museum will be debuting a brand-new exhibit, *Daughters of Hanford*. This collaborative exhibit has been made possible through the hard work of public radio correspondent Anna King, photojournalist Kai-Huei Yau, Washington State University Tri-Cities artist Doug Gast, and WSUTC undergraduate student Joe Jensen. *Daughters of Hanford* will highlight the historically underrepresented perspectives of women of the nuclear site. The Daughters project will include twelve radio feature stories, a multi-platform website, a geo-mapping application, and an interactive large-scale portrait exhibition. After its engagement at the REACH, the Daughters project will go on tour and be on display at other public institutions around the Pacific Northwest. REACH staff also are working on additional modifications to the Manhattan Project Exhibit to include the story of Robley Johnson, the Site's official photographer.

Most recently, in our rotating gallery we installed *The Power of Nuclear Energy. Energy Northwest Through the Years: the story of the Columbia Generating Station*. This historic timeline of the Columbia Generating Station is accompanied by the podium and chair that John F. Kennedy used during his visit to dedicate the nuclear reactor in September 1963. A Geiger counter interactive will also be installed in the exhibit.

From January 6th through the 21st, the REACH is hosting the Tri-City Model Railroad Association. They have set up their model train display in the Great Hall measuring

28 by 20 square feet. Education curriculum has been developed in conjunction with this show that emphasizes the history of trains in the Mid-Columbia region; from early steam trains to the Hanford supply trains, and the role of trains today. Members of the Tri-City Model Railroad Association will be on hand for “on the spot” interpretation during regular operating hours.

We are thrilled to announce the return of our baby Mammoth! Baby Ems has been on display at the Wenatchee Valley Museum for the last two years while the REACH was under construction, but has now made her way back home. This complete baby skeleton will be joining our permanent display collection and can be seen in Gallery One's Gateway to the Hanford Reach National Monument exhibit starting January 15th.

The *REACH Through Art*, is our rotating art exhibition that features the work of local and regional artists. Twice a year the REACH Museum solicits art from regional artists for works that visually capture the rich history of the Hanford Reach, the land, the river, and its people. The new installation will open Tuesday, January 27th with a reception and public panel discussion featuring the selected artists on Friday, January 30th from 5:30pm to 7:30pm. Light refreshments will be served—tickets are \$7 for adults and \$5 for seniors and youth. For more details, call (509) 943-4100.

The education department will be hosting its first ever spring break camp this March and April. The Art of Nature spring break camp will take kids aged 9 to 13 on outdoor field excursions to the Hanford Reach National Monument, the Columbia River and its Snake and Yakima confluences, and other outdoor resources in community. In the afternoons, those kids will then learn to paint what they saw and experienced with local artist, Gail Roadhouse. The 9am to 3pm camp starts Monday, March 30th, and ends Friday, April 3rd. Space is limited, registration opens February 1st, 2015. For more details or for registration, please call Kris Cargile at (509) 943-4100 ext. 108.

The REACH Museum is located at 1943 Columbia Park Trail in Richland, Washington. Winter hours of operation are 10am to 4pm Tuesday through Saturday, 12pm to 4pm Sundays, and closed Mondays. Winter hours of operation take place from November 1st to March 31st. Regular hours of operation are 9am to 5pm Tuesday through Saturday, 12pm to 5pm on Sundays. The REACH is closed Mondays. Admission is \$8 for adults, \$6 for youth and seniors 65+, and children under 5 years-old are free.

More On The “Mysterious Event” (cont’d)

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Fermi utilized graphite and uranium purification, increasing the reactor size and a better geometry for spacing the uranium to obtain a multiplication factor greater than one, but just barely so. Left unresolved was whether the parasitic effects of additional materials (like water and aluminum) plus the effects of large quantities of fission products could be overcome in a large reactor. This problem was recognized by most everyone involved in early reactor design but, according to Babcock, perhaps the person who gave the most profound thought to this subject was Wheeler.

Wheeler joined Babcock’s team and continued throughout 1943 to calculate the effects of every item added to the large reactor design along with a factor of known Fission Product absorption that led to the September 24, 1943 review memo (from Wheeler and Babcock) that the calculated multiplication constant had shrunk to +0.75% and might even be negative! The memo stated “Obviously redesign is required.” The memo recommended drilling the Shield Blocks for 504 additional tubes and enlarging each tube hole o.d. by 60 mils to allow larger fuel elements. Since Manufacturing determined that the process tube revisions would only delay production by 1-2 weeks, they were incorporated. An additional recommendation was to increase the fuel columns from 32 to 36 slugs but this was not done until after the Startup failure.

This brings us to the fateful night of September 26, 1944. The story proceeds as originally told until the first shutdown except the number of tubes loaded was 901 and the full power level was 9MW. Originally, I stated that Fermi patiently waited out the “water leak into the graphite” theorists. Actually, they did a thorough drying of the graphite by passing hot helium through it but failed to get a significant amount of water out (tens of gallons were expected if it was the cause). During the drying operation, the multiplication factor was measured from time to time. By 1:00 AM on September 28, a multiplication factor of greater than 1 was observed and the reactor was brought up to 200KW so further gains could be observed. By 4:00 PM, the multiplication had increased enough that the power level could again be raised to 9MW. Continued operation at this power level was again showed to be impossible as indicated by an almost instant drop in neutron multiplication and the power was lowered again to 200KW about 5 hours later (from the Operating Data graph. (See Figure 1). What followed was the all-night study session by John Wheeler and Chas Wendt with Wendt providing the radioactive growth and decay curve and Wheeler comparing the half life data to a table of fission products. Babcock’s 1964 article indicates that the Iodine-Xenon mother-daughter relationship

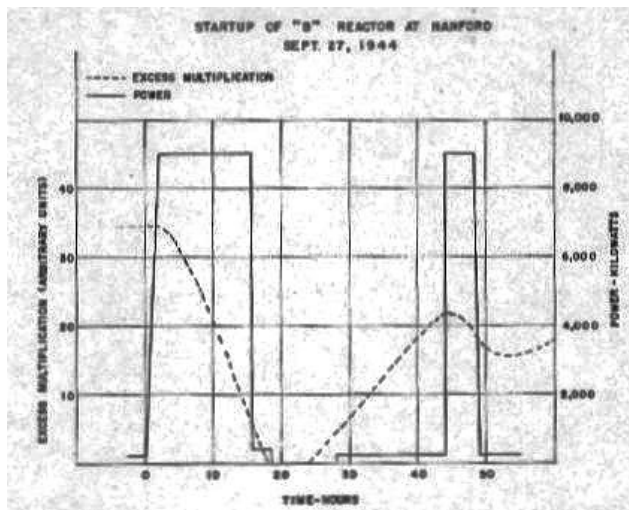
was determined that night but that story may have been simplified by the Editors since he tells a slightly different story in his 1981 letter.

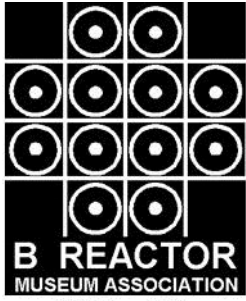
In that letter, Babcock states that Greenewalt had suggested that all Technical Division personnel, except critical people, stay away from the Startup to reduce crowding. Therefore, he did not learn of the Shutdowns until the morning of the 29th when Greenewalt picked him up at the Transient Quarters for the ride out to the DuPont offices in the 300 Area. Upon arrival at the offices he learned that “(Wheeler) had identified three mother-daughter pairs anyone of which might be the culprit.” He (Wheeler) thought that all three decay characteristics should be compared to the (Wendt) curve by breaking up into three teams to do the calculations. Babcock-Paul Gast took the Iodine-Xenon pair. Wheeler-Wendt and Fermi-Leona Marshall took the other two. Wheeler-Wendt quickly eliminated their pair and joined with the Babcock-Gast team. Babcock assumed the role of data plotter and stated that “Very soon John, Paul, and Chas were turning out data so fast that it was all I could do to plot the data they produced.” They were thrilled to see their plot match the (Wendt) curve and reported the results to Fermi-Marshall who had also eliminated their own pair.

Fermi-Marshall then calculated the reactivity gains necessary to overcome the Xenon poisoning and determined that the recommendations in the 1943 memo (full 2004 tube loading and longer fuel columns) would probably allow the full 250MW to be attained. They also determined that the reactor, at present conditions, could run at 3.7MW continuously and adding 100 tubes (and extending all the fuel columns) should allow 15MW operation.

Babcock, in his article, raised the possibility of problems in controlling the increased reactivity, on Startup, from adding more metal and the decision was made to add additional tubes in segments with several days operation before adding more tubes. Between September 30 and October 20, the number of tubes loaded (with the long fuel columns) was increased, in segments, from 901 to 1492. The reactor operated between 90 and 180MW for one month before shutting down for an early discharge of elements for cooling and sending to Separations.

According to Babcock, the Control System was barely adequate at 1500 tubes and something needed to be done before adding more tubes. An “auxiliary control method” was developed during the December 20 shutdown for discharge and loading to 2004 tubes and hooking up the Pig Tails to the water system. Babcock does not identify what this control method was (probably classified at that time) and not being a reactor expert, I assume it had something to do with the order and the extraction amount of the Control Rods. In any event, B Reactor restarted (with the full 2004 tubes) on December 28, 1944 and reached full power of 250MW on February 4, 1945.





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Dupus Boomer—by Dick Donnell

