

# ***OUR OTHER INVALUABLE ‘APPRENTICESHIP’***

*by Bill Lee*

## ***Introduction***

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Over the past several decades, a number of apprentice alumni, including yours truly, once again became apprentices of a sort. Our second and equally invaluable apprenticeships came about when we entered the shipyard’s Shift Test Engineer (STE) Training Program. Included was a lot of ‘over the shoulder’ training plus specialized and classified study at the graduate degree level. For some of us, the venue for that training was an Apprentice School classroom during the heat and humidity of the summer of 1964. Sometimes, you can go home again...



I have no idea how many apprentice alumni have had this fairly unique experience over the past several decades. I don’t know how many STE’s (they’re now called Reactor Plant Test Engineers) have been qualified at Newport News Shipbuilding or, for that matter, how many candidates ‘washed out’ along the way. I don’t even know much about the current, classified curriculum, the training facilities currently in use or any other details of the on-going training of Reactor Plant Test Engineers at NNS.

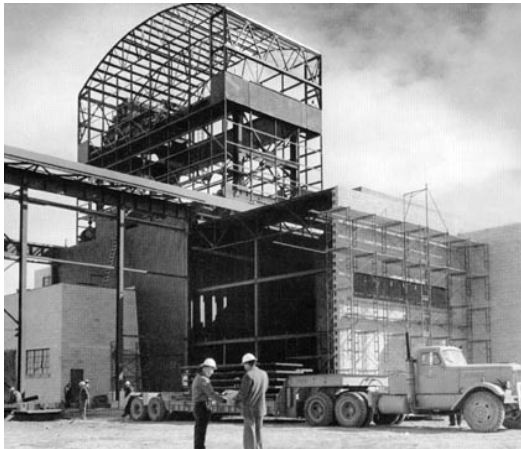
But, I do know that the training program’s informal beginnings included a small group of pioneering apprentice alumni; some of whom were real characters (no surprise there!). This is our story, preceded by some background about the program before it became formalized in 1962 and before my personal experience of qualifying as an STE.

## ***In the beginning***

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The actual start of the Company’s nuclear power test program was a natural outgrowth of NNS’ design and construction activities associated with a land-based prototype for aircraft carrier propulsion that was built in the 1950s at the Naval Reactors Facility (NRF). Located in a remote part of Idaho, it was officially named the A1W prototype, also widely referred to as the ship in the desert. When it came time to test and start-up that full-scale, propulsion prototype, engineers and construction supervisors working for a shipyard subsidiary, The Eastern Idaho Construction Company (EICC), assumed they would proceed with those evolutions pretty much as they always had at Newport News.

That was most emphatically not to be...



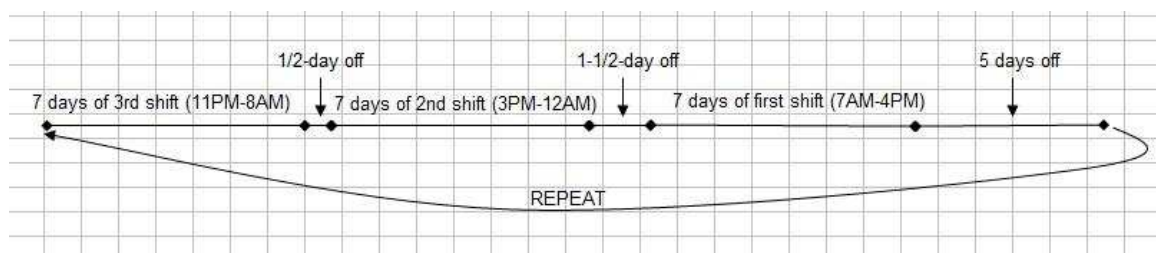
The A1W prototype included two nuclear reactors; the biggest in the Navy, back then. Admiral Rickover had fixed ideas about the need for extreme care and competency when it came to testing and operating his creations. Others at NRF, including experienced conventional naval propulsion plant operators had already gone through a trying learning experience in order to satisfy his demands during testing and initial operations of the prototype for the submarine NAUTILUS.

Nudged, to put it mildly, into conformance with the Rickover ‘way’ of doing things, NNS engineering personnel working in Idaho shifted gears. Led by EICC Chief Engineer **Felix Bledsoe** (Honorary Apprentice Alumnus – 1980), set about to comply. Thus, the keel was unceremoniously laid by NNS for its version of the STE training program.



There were no formal classes, no prior practical experience requirements and no written or oral exams. All that would come later. Training was largely conducted informally, on the job, by people with NAUTILUS prototype experience. For the most part, they were Westinghouse engineers who had created training materials and operating manuals for sailors’ use in qualifying on the sub prototype. Although the NNS trainees were not officially allowed to actually operate equipment, rumors persist to this day about some of them tasting the forbidden fruit of ‘hands-on’ operations in the wee small hours...

A lot of ‘over the shoulder’ training took place as NNS engineers and naval personal alike learned by doing. New phraseology and acronyms soon crept into their lexicon. Because testing and start-up took place around the clock, seven days a week, sailors and shipbuilders worked in shifts. To adequately cover weeks, sometimes months of such shift work, each job required four people. A four-section, 28-day cycle was created at NRF that included shift overlaps and was dubbed the Idaho Shift. People so engaged were anointed with the descriptive and all-encompassing title of Shift Test Engineer.



To be sure, other titles, in the hierarchies of various testing organizations at NNS were also utilized. But for years, all of the men who qualified were best known as STE's. Although never officially recognized as such, there is general agreement that Felix Bledsoe was the first Newport News Shift Test Engineer. His Idaho responsibilities were expanded on December 31, 1958 to include the duties and title of Chief Test Engineer for the A1W Prototype. He later repeated this role during construction testing of the propulsion plant for ENTERPRISE (CVAN-65).

Working and learning together, Navy and NNS personnel performed all the testing required in order to allow the A1W prototype to become not just a 'proof of principle', but also to serve as a training facility for decades. After NNS' work at A1W was done, Felix Bledsoe stayed on for nine weeks, standing watches with navy personnel, and learning and absorbing techniques that later proved invaluable to him. During an interview in 2001, he stated with conviction:

*"That experience was the best thing that ever happened to me. It trained me for the work I did on ENTERPRISE".*

By late 1959, it was time for Felix Bledsoe and his associates to turn their attentions to preparing for testing of the world's first nuclear-powered aircraft carrier...

### ***Semi-formal STE training***

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Semi-formal only implies that the training became slightly more organized; not that any dress code was required! Blue jeans and khakis were certainly the unofficial uniform of the day for 29 engineers sent to Idaho from Newport News in early 1959 to become STE trainees. They were a curious mix of naval and merchant marine academy graduates, retired naval operating personnel and college-trained engineers. That latter group included several graduate apprentices.

They endured six months' of Idaho Shift work in Idaho because of another Rickover 'request'; i.e., that the shipyard's test engineers for ENTERPRISE be trained and qualified to a level equal to that of the Navy's nuclear propulsion plant operating crews. Their 'over the shoulder' education largely consisted of standing watch with navy operators and trainees, plus tracing systems and getting quizzed by instructors, right along with the navy trainees.

Reactor theory and numerous related subjects were studied at their homes in Idaho Falls, on long bus rides to and from NRF and in a break room on site that had been the EICC construction office. At the end of their stay in Idaho, they received certificates attesting to their completion of what was dubbed "The CVAN-65 Operational Test Program". When they returned to Newport News, they immediately went to work performing very basic testing onboard ENTERPRISE while she was still in her building dock.



As one STE from that era well remembers:

*“All that advanced study and months of training initially led to me holding a Birdseye diaper over the end of a pipe being flushed and disputing the counting of any metal particles with QID!”*

In parallel with aircraft carrier work, by the late 1950s NNS was heavily engaged in nuclear-powered submarine construction work. STE's needed for those projects went a different route to receive their semi-formal training. Eight were sent to Mare Island Naval Shipyard to learn about nuclear plant testing firsthand on two subs nearing completion there. Five other fledgling STE's went to Portsmouth Naval Shipyard in Maine where two more subs were in the early stages of reactor plant testing.

At both of these naval facilities, NNS trainees were integrated into reluctant host yards' test groups. After all, the Admiral had spoken... When they returned to NNS, both groups immediately became the shipyard's core test group for S5W reactor plants.

### ***Justifying their presence***

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Putting into practice their recently acquired skills was hard enough, but the first STE's assigned to work on the NNS waterfront faced additional problems. This sudden influx of office-type engineers in the bowels of ships under construction came as a shock. Of course, additional shocks came when the Quality Inspection Department's (QID) and Radiological Control Department's (RADCON) personnel were added to the mix. Veteran trades' supervisors who had not been to Idaho initially contested all these 'trespassers' on their turf.

Fortunately, the ranks of STE's included several apprentice alumni, whose faces and reputations were familiar to many on the waterfront. The same was true of the QID and RADCON, since those departments had been created by drawing people, many of whom were graduate apprentices, from various trades.

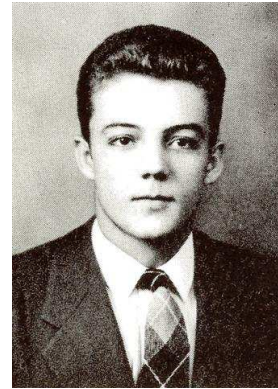
The first STE's at NNS included **Joe Chalmers** (Designer, Piping - 1948), **Norris Monk** (Patternmaker - 1951), **Dewey Stinson** (Boilermaker - 1948) and **Wilson Urrutia** (Designer, Machinery - 1940). They had followed their apprenticeships by getting college degrees from various engineering schools. That combination of training and related experiences allowed them to become some of the first members of the STE brotherhood.



Joe Chalmers



Norris Monk



Dewey Stinson

Not only did they have a new and unique job to do, they also had to pretty much invent *how* to do it through trial and error. Along the way, they got second-guessed by NNS people on the waterfront and in the non-nuclear engineering departments, by local Westinghouse and Naval Reactors representatives, as well as by the members of Pre-Commissioning Units who had arrived at Newport News far earlier than was customary. Although this latter group had endured and mastered the same kind of training as the STE's, their future responsibilities and desire to get everything as perfect as possible, often led to vocal and sometimes almost violent differences of opinion.

Those stressful days were often relieved by a new brand of shipyard humor. STE-related cartoons and cute quotes that mysteriously appeared on bulletin boards were a mixture of waterfront roughness, contempt for desk-bound engineers and biting commentaries about test engineers' titles, responsibilities, pay and benefits.

In addition, their crude cartoons and sometimes considerably cruder vocal comments were heavily laced with the newly-acquired jargon of this elite group. Few outside the inner circle of Shift Test Engineers fully understood all of the subtleties. In numerous instances, that was a good thing!



By the end of 1961, just ten years after first becoming involved in the Naval Nuclear Program, the shipyard had delivered the world's first nuclear-powered aircraft carrier plus two nuclear-powered submarines. Two additional subs had been launched, and were nearing completion. The STE Program had proven its worth and was in full swing.

But more changes were on the horizon...

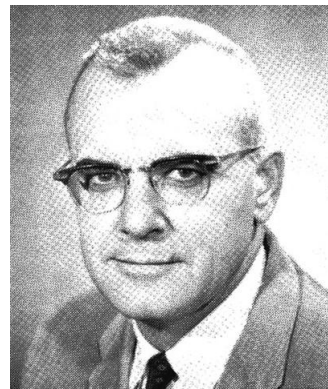
## *Getting studios about training*

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By April of 1962, it had become apparent that a more formalized training program for Shift Test Engineers was desirable. Much more than just desirable, Rickover had 'requested' a further ramp-up in STE training. Everyone involved understood that his request was another non-negotiable demand. He dictated that all future candidates at Newport News Shipbuilding had to pass written and oral examinations administered by Naval Reactors in order to become qualified. A rigorous program, along the lines being used then by the Navy for its nuclear operators was spelled out. Qualification would no longer be relatively quick, easy or informal, and some personnel failures could be expected, as had been the Navy's experience.

The shipyard had little choice. By 1962, Rickover's word was law throughout the Nuclear Navy and all supporting shipyards. In addition, not only would a host of nuclear subs already under contract increase the number of STE's needed, the yard was making preliminary plans for the first refueling and overhaul of ENTERPRISE and had expectations of doing the same for the nuclear-powered cruiser LONG BEACH. But, some people who had become qualified became burned out with the rigors of the job, and months on end of the Idaho Shift. Some requested transfers; others left the Company entirely. As a consequence, the shipyard committed to the development of a full time, formal training program for STE's to support work on nuclear-powered vessels.

Fred Kaiser was selected to create and administer the program. Fred was a studios fellow who been in the first group of six engineers to go to Oak Ridge in 1952 to study nuclear physics. Fred also had participated in the construction and testing of the A1W Prototype, followed by other assignments in the Atomic Power Division. After spending a short period of time at Naval Reactors to learn exactly what was expected of him, Fred returned to NNS and established a program that was fondly known by its participants as *Kaiser's Kollege of Knuclear Knowledge*.

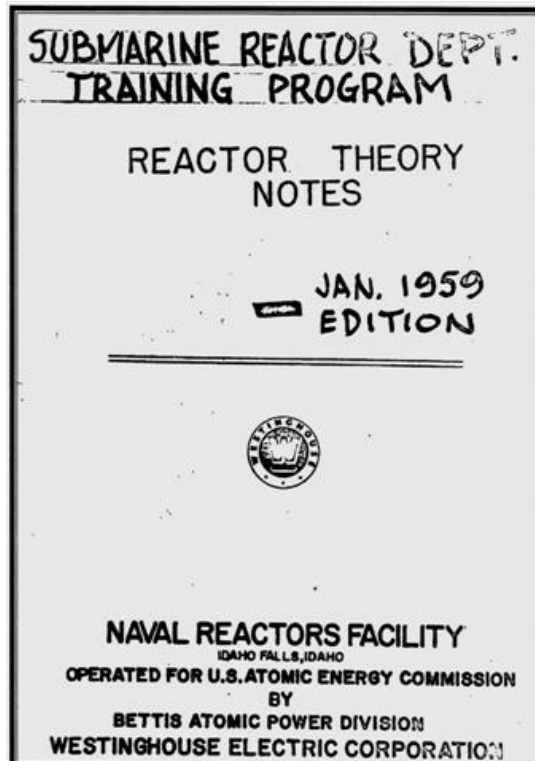


Fred also brought back from Rickover's organization an unexpected complication. The Admiral insisted that the shipyard's program for STE's be reactor type-specific, which resulted in the necessity for Fred to establish several multiple-path training courses to support work on the differently designed propulsion plants for nuclear-powered carriers, cruisers and submarines.

A pilot program was set up and five individuals were selected for this 'new wave' of training. Probably to guarantee early program success, all of them were guys who had previously been qualified and had served as STE's. They were not thrilled with the prospect, and it took all of Fred Kaiser's persuasive skills to coax them off submarines in May of 1962 and into a makeshift classroom.

For fifteen weeks, Fred lectured effectively and effortlessly...some remember it as endlessly, as well...on the second floor of Building 53, a waterfront building that dates back to the earliest days of the shipyard. Study materials were a combination of graduate-level engineering school texts, Navy Nuclear-specific materials obtained in Idaho and system descriptions, diagrams and operating procedures then in use at NNS. To facilitate home study by his students, Fred arranged to get a large amount of basic material associated with reactor theory, heat transfer, metallurgy, radiation, water chemistry, reactor control systems, etc. de-classified.

When that initial cadre of five STE candidates all passed the government's written and oral exams, they went right to work. Ironically, they returned to testing on the same class of submarine reactors they had been on before.



In those early days of formalized training, Fred Kaiser was under pressure from the shipyard management to hold down the cost of STE training since it was not contractually required and therefore non-reimbursable by the government. But at the same time, the Company expected Fred to help satisfy the ever-increasing demands for near-perfection from Rickover. For a while, until he became virtually indispensable, Fred's career depended on his won-loss record (i.e., number of qualified STE's vs. 'washouts'). To keep his percentages high, Fred used his own testing experience to pre-screen candidates. He also had some other tricks up his sleeve to help ensure success.

His most successful one was to build a 'bible' of previously-asked questions. When written tests were administered by the government, Naval Reactors personnel hand-carried the tests to Newport News and proctored the examination periods. No one at NNS, other than those being tested, were allowed to see, much less obtain a copy of the questions. That did not deter Fred.

After each exam period, he'd immediately debrief the individuals who had been tested. The questions asked, both written and oral, constantly evolved and were also tailored to individual naval reactor plant designs. During follow-up oral examinations, Fred was permitted to sit in, and he took copious notes. Over time, Fred built up a backlog of over 500 questions and answers that STE candidates found to be invaluable.

## ***Our second, equally invaluable apprenticeship***

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In the early spring of 1964, as plans and preparations for the first refueling and overhaul of CVAN-65 were being finalized, an eclectic group of largely youthful STE candidates was identified. They included a deliberate discipline mix of mechanical and electrical engineers, plus others who had demonstrated a natural affinity for operational testing. A handful of these individuals had been qualified and had worked as STE's on submarines. A couple of them had been informally qualified in Idaho and had worked in the ENTERPRISE construction testing program. But they all had to re-qualify to work on the carrier during the 1964/1965 time period when CVAN-65 returned to her birthplace.

Others in the selected group had been assistants to the STE's and worked as Mechanical Test Engineers (MTE's) or Electrical Test Engineers (ETE's); mostly on submarines. Their education had been almost entirely of the 'over-the-shoulder' kind. About half the candidates were in their early twenties; recent graduates of various maritime schools. They had good conventional marine power plant educations and had spent one or more summers at sea, learning in engine rooms. But they knew little about shipbuilding or the Naval Nuclear Program. A couple more members of the group were former Navy NucS who had left the service and were working at NNS as MTE's or ETE's.

Six members of this group were graduates of the Apprentice School who had subsequently gone to college to obtain engineering degrees: **George Morse** (Designer, Piping – 1947), **Kenny Cassel** (Machinist - 1947), **Jim Schade** (Machinist – 1951), **Bob Wheeler** (Electrician - 1952), **Al Marshall** (Electrician- 1958) and, yours truly, **Bill Lee** (Designer, Atomic - 1959).

Regretfully, I have to report that four of the six apprentice graduates identified above are no longer with us. The fifth alum, Kenny Cassel is in declining health, and presently is in a skilled nursing facility in Suffolk, VA. That leaves only me to tell our story...

All six of us had some test or test support experience. For example, I had spent the winter of 1963/1964 onboard ENTERPRISE whenever she was berthed at the Norfolk Naval Base, serving as a waterfront liaison/support engineer. I worked hand-in-hand with the trades engaged in propulsion plant modification and upgrade work. I also participated in testing the changes made, working closely with the ship's crew. The idea of being fully qualified to take reactors critical and operate them greatly appealed to me. So did the overtime pay.

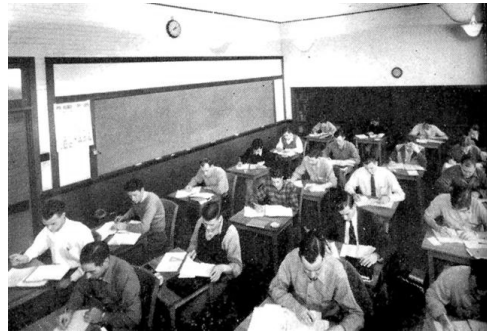


The diverse personalities selected numbered 28. A minimum of twenty-two qualified STE's were needed to work the Idaho Shift and fill six test supervisory positions. Before our fifteen week STE training program started, we each were evaluated to determine our individual practical experience; one of several prerequisites for entering the course.

Those who had been previously qualified, or had served a pre-determined minimum period of time as an MTE or ETE were excused from acquiring additional practical experience. Several of us had some testing experience onboard nuclear ships under construction or during subsequent modification work, and were permitted to work a limited number of weeks in submarine test programs underway at the time in order to satisfy that prerequisite.

I spent about a month engaged in hands-on test work in the crowded confines of the propulsion plants of two nuclear-powered submarines. During that intensive period of time, I worked seven days a week on the second shift. I was rewarded by witnessing initial criticality for those vessel's reactors. That was a fascinating first for me.

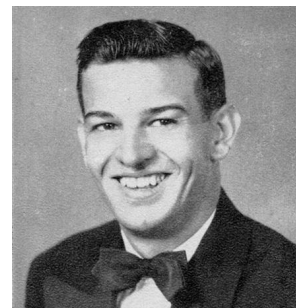
By mid-June, 1964, the entire group had met all the prerequisites. Room 101 in the Apprentice School building was commandeered for use. This was the same room in which I had studied Introduction to Shipbuilding in 1954. It looked exactly the same as it had ten years previously and just like it appears in this early 1940s photo. The only change was the installation of several large file cabinets, each one fitted with a combination lock and a sturdy retaining bar. Room 101 had the same small, rickety wooden tables and hard-back chairs that countless apprentices had previously squirmed and sweated upon.



In 1964, the Apprentice School building was not air-conditioned. Because of the confidential nature of the paperwork and conversations associated with our training, large warning signs were posted inside and outside the room. The sole door was supposed to always be closed and locked; the windows likewise. Throughout that summer, lectures and self-study periods were endured in this room. After several attempts by Fred Kaiser to keep the door and windows secured, and faced with mass mutiny, he simply gave up.

A few oscillating fans were brought in, which mostly just stirred the tepid and humid air, and helped introduce fine metal particles and industrial-grade dirt from close-by manufacturing operations. The unending noises of a busy shipyard did nothing to enhance our place of study. Looking back, it's hard now to comprehend how we learned so much in so little time, under such conditions.

Each of us was assigned a file drawer in which to keep study materials. Whenever the room was vacated, all classified materials had to be locked up in those file cabinets. The chalk boards had to be erased. The door and the windows had to be locked, and only George Morse, the senior-ranking student and the CVAN-65 Chief Test Engineer-designate had a key.



Going out to lunch proved to be more trouble than it was worth. Leaving the room closed up in the summer heat made for an even more miserable afternoon than if the room remained occupied. Guys took turns going to the shipyard canteen. The standard fare was hero sandwiches, chips, cold drinks and “Dixie Cups” of ice cream that included flat wooden spoons which splintered unless the hard-frozen cups were warmed in the sun on a window sill for a couple of minutes. Some of the fellas brought their food in black lunch pails whose thermos bottles had been filled with crushed ice; a lesson already well learned from waterfront testing work. Lunches were quickly consumed and the remaining free time utilized to seek help from the more experienced members of our group.

Frequently, messages of intended inspiration and updates concerning problems reported from waterfront operations were put on the room’s chalk board by Fred Kaiser. For example, there was an ongoing problem with chloride contamination of water used in testing. Other postings that mysteriously and frequently appeared were decidedly less official, as the following examples attest.

1. IN ANY FIELD OF SCIENTIFIC ENDEAVOR, ANYTHING THAT CAN GO WRONG, WILL GO WRONG.
2. LEFT TO THEMSELVES, THINGS ALWAYS GO FROM BAD TO WORSE.
3. IF THERE IS A POSSIBILITY OF SEVERAL THINGS GOING WRONG, THE ONE THAT WILL GO WRONG, IS THE ONE THAT WILL DO THE MOST DAMAGE.
4. NATURE ALWAYS SIDES WITH THE HIDDEN FLAW.
5. MOTHER NATURE IS A BITCH.
6. IF EVERYTHING SEEMS TO BE GOING WELL, YOU HAVE OBVIOUSLY OVERLOOKED SOMETHING.



**DAMN THEM CHLORIDES!!**

For almost four months, we sweltered and studied in that room for a prescribed eight hours a day/five days a week. That’s the number of hours for which we got paid. Our course curriculum included the following topics and durations:

- Reactor Theory, Health Physics and Water Chemistry – 70 hours
- Reactor Plant Fluid Systems – 100 hours
- Reactor Plant Instrument & Control Systems – 104 hours
- Secondary Plant Systems and Electrical Power – 90 hours
- Overall Operation and Interrelations – 160 hours
- Shipyard Testing Support Facilities, STE Administration and Safety – 100 hours

These topics were a mixture of graduate-level engineering and nuclear physics, basic power plant engineering information, ship-specific characteristics and a host of things we had to be able to accomplish in order to correctly function as STE's. Shipyard manuals covering the practical aspects of various safety-related subjects were amongst the best of our training aids.

In addition to concentrating on our studies through noon hour, we also were encouraged to invest heavily in self-education. Most of us took home un-classified materials which included hand-written notes taken during Fred's lectures. Mine were printed, since even I could not always read my own hurried, left-handed script. I estimate that I amassed somewhere close to 1,000 hours in classroom participation and self-study at home.



**NUCLEAR SAFETY**

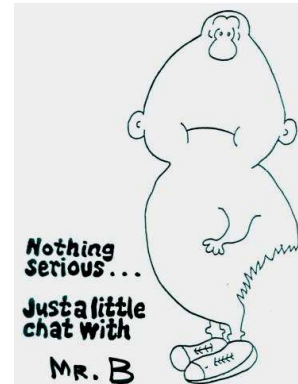
SAFETY + WATER CHEMISTRY AND RADICAL ARE IMPORTANT GENERAL DOCUMENTS.  
 THE OPERATOR IS MOST IMPORTANT SAFETY FEATURE  
 DANGERS ARE CONTAMINATION (DAMAGE) TO PLANT, CREW SAFETY IMPAIRED  
 AND PUBLIC SAFETY COMPROMISED.  
 GREATEST HAZARD IS POSSIBLE RELEASE OF RADIOACTIVE FISSION PRODUCTS.  
 THESE ARE LOCKED-IN FUEL ELEMENTS.  
 NORMALLY MOST CREW'S RADIATION IS NIL (SUC & LINC) PRODUCT OF O<sub>2</sub>.  
 HOT CHANNEL MELT-THRU IS MOST LIKELY ACCIDENT.  
 DAMAGE OF FUEL ELEMENTS MAY BE BY OVERHEATING, OVERSTRESSING  
 OR CORROSION.  
 NUCLEATE BOILING IS OK DURING TRANSIENTS (NORMALLY PLANT IS SHUT)  
 DANGEROUS BECAUSE STEAM HT. TRANS. COEFF. IS 1/20 OF H<sub>2</sub>O.  
 CLADDING WILL MELT @ 3300°F (LOCALIZED MELTING IS MOST PROBABLE)  
 ZIRCONIUM (CORROSION) AND PROPER CHEMISTRY (HIGH PH) RESIST CORROSION.  
 CHLORIDE STRESS CORROSION ON STAINLESS STEEL IS WORST  
 WHEN MAT'L IS HOT, UNDER STRESS AND O<sub>2</sub> + CHLORIDES ARE  
 PRESENT. (VERY RAPID - MINUTES)

Each Friday, Fred would usually give us a quiz, then the answers when we were done so that we could grade ourselves. Each STE-candidate proceeded at his own pace, and the slower learners were helped by those that had previously been test engineers. It was the start of a camaraderie based on one simple premise: If enough of us didn't get qualified, then the 'lucky' ones would have to work additional hours to compensate for the lack of a full complement of STE's.

Near the end of the training course, we were subjected to an 100-question quiz. It mostly consisted of questions actually used in Naval Reactors' past qualifying exams. Additional study on our weak points took place for several more days. In parallel, individual, mock oral interviews were conducted by shipyard people in an adjacent Apprentice School classroom. One of our practice inquisitors was Dick Broad, who by then had become the head of the shipyard's nuclear power operations. Dick had a legendary quick and volatile temper, which several STE candidates experienced, shall we say, up close and personal.

Dick felt the necessity for our success as much (or more) than we did, for he was the shipyard's point man with Admiral Rickover. Any failures on our part would also befall him. Up close and personal...

After one particularly rough session, one of the candidates, who was not an apprentice alumnus I might add, froze under intense questioning and almost broke down. He was literally shouted and chased out of the oral exam room by Dick Broad, according to those in earshot. The next day, this image appeared in Room 101. George Morse didn't let it stay posted very long, but it somehow then made its way to the Apprentice School office where a cooperative secretary made multiple Xerox copies for mass 'distribution'. As far as I know, Dick never saw it.



Although Fred declared that we were ready, some in the group were border-line. In fact, one fella had already dropped out, unable to keep up. But the time for manning the ship was fast approaching and Fred had to tell NR to come to town and administer their test.

### ***Then it was time***

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I don't recall the date, but I do remember it was a nice autumn Friday in October when we took our written exam in Room 101. The exam had five sections, much like a state-administered medical, legal or engineering test. There was a time limit for each section. Perhaps, in total, there were a couple of hundred questions. But no one stopped to count.

We were closely monitored by Naval Reactors and by Fred. Trips for water or relief were made individually, with an escort. The testing went on non-stop for eight hours, through lunch hour and only punctuated between sections of test by short breaks. During break times we could get up and move around, but not talk to one another, leave the room or open any notebooks. The more experienced guys finished each section early, but some less-fortunate didn't. Like all such tests, we were encouraged to skip over questions we could not answer immediately and come back to them, if any time remained.

No one dared to cheat. But something unexpected and amusing happened that day. A lot of NR's questions were identical or nearly so to ones we had previously seen. Very early in the all-day session, one of the guys broke the serious silence by chuckling and uttering a number. That's all, just a number. Since everyone was working on the first section, most of us turned to that section's number. There we found a familiar 'friend'; one whose 15-part answer we had been told was extremely important and which we had memorized.

As the day droned on, occasionally someone would mutter another number. Surreptitious smiles were exchanged between students; frowns appeared on monitors' faces. They never caught on. Of course, it didn't really matter; we were not exchanging answers. But that little bit of spontaneous levity made a very stressful situation slightly more pleasant.

At 3 PM, the last section's answer sheets were collected and whisked away to Washington. We had previously been told that it would take Naval Reactors several days to grade the tests. Some of us took vacation days, some went back to their old jobs for a few days to help get ready for the impending arrival of ENTERPRISE at NNS. I was one of those guys, which soon proved to be very fortuitous.

That afternoon we all went to a neighborhood bar in Hilton Village to unwind. Called Adam's Place, it was more affectionately known as the Hilton Country Club by local patrons. I'm sure the regulars there, some of whom I knew because of my local upbringing, didn't like their happy hour invaded by an unknown bunch of noisy guys, several of whom had decidedly Yankee accents. The highlight of that watering-down period came at the very start. One of the maritime academy guys, 22 or 23 at the time, had a baby face. The bartender carded only him, which took him years to live down.

### ***Back to reality***

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The next week, we were quietly and individually advised if we had passed the test or not. As best I can recall, eight didn't pass and had to undergo further study for the one or two sections in which they had been judged deficient. They were retested on those sections weeks later. A couple of those guys failed a second time and were 'washed out' of the STE program. Final score: 25 for 27 (excluding the drop-out). Fred was delighted.

Those of us that passed the first time returned to Room 101 and started preparing for the all-important orals. On the appointed day, we were individually summonsed to an adjacent room to face a team of inquirers. This time, they included representatives of Naval Reactors and Westinghouse, as well as the shipyard. It was like the interviews often seen on TV today. One poor guy besieged by multiple questions from impatient people; his attempts to answer coherently and completely constantly interrupted.

Part of that exercise was to see if we knew our stuff. But it also was diabolically calculated to see if we could hold up under pressure. Dick Broad and Fred Kaiser were allowed to sit in, but not talk. Head down, Fred labored on his notes. Dick just watched, but his facial expressions gave us clues if our answers were on track or not.

One of those doing the asking was the local representative for Admiral Rickover. He had an agenda. He didn't think NNS was keeping trainees up-to-date on matters important to the refueling and overhaul of ENTERPRISE. Told there was a practical limit to how fast such information could be disseminated, he set about to prove he was right and the shipyard was wrong. So, he asked each candidate a question about a newly identified, safety-related detail that had not been included in our training. Most didn't have a clue. Some had enough experience to conjure up a reasonable, albeit incomplete response on the spot. Then, it was my turn...



***Rather be lucky than good***\_\_\_\_\_

The question repeatedly asked happened to be about a 'ship-alt (i.e., a retrofit) I had worked on just before entering STE training. During the break between the written and oral exams, I had spent time back in the APD design office and had worked on the procedure for testing the modification. By pure happenstance, I knew more about the details of that retrofit and its safety implications than just about anyone at NNS!

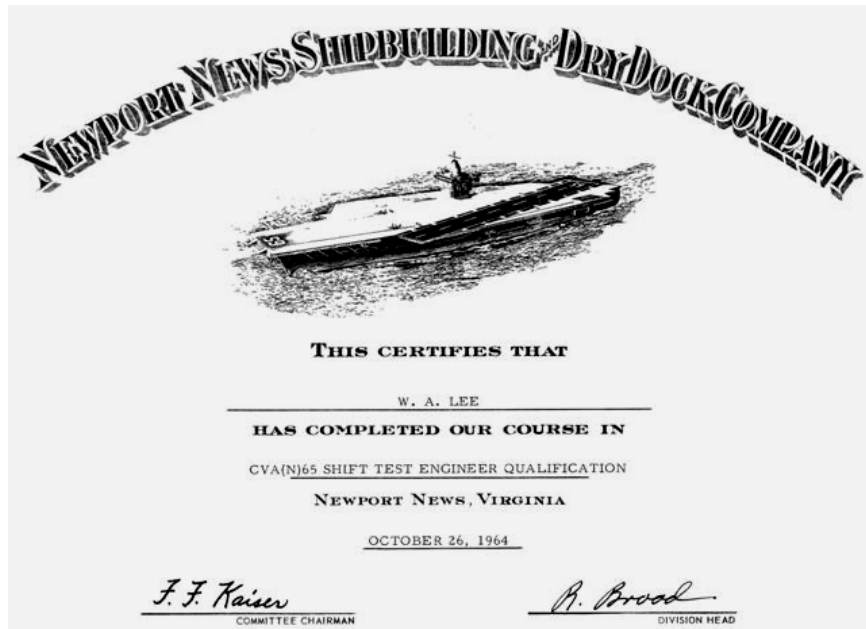
My answers obviously astounded the guy, as well as almost everyone else present. The Washington-based Naval Reactors representative knew of my participation in the work, but didn't say anything. I learned, years later, that he had not been in favor of the local NR guy using the orals to underscore a disagreement at the expense of hapless trainees.

After a brief silence, I was asked some more questions and then dismissed. It wasn't long before Dick Broad pulled me out of our classroom and asked how in the world I knew the answer to a question no one else had handled very well...or at all. I probably said something about rather being lucky than good, and explained the coincidence. That was one of the few times in the 1960s I saw Dick Broad smile...and do so broadly.

***Qualified and then imposed on***\_\_\_\_\_

Days later, the majority of us were informed that we were fully qualified. Suitable certificates soon followed. Aside from my apprentice certificate, it is the most treasured of the diplomas, certificates and licenses I have amassed during my professional career.

All but one of the A-school grads/STE Candidates qualified in time to support the ENTERPRISE work. George Morse became Chief Test Engineer and Kenny Cassel his assistant. Bob Wheeler was made one of four test supervisors and I was named lead STE in the propulsion plant that was scheduled for a large number of first-of-a-kind tests at NNS.



In addition to certificates, we received hourly pay raises. I forget how much, probably 5% or less, but it was significant at the time. We also got shiny white hard hats that had *SHIFT TEST ENGINEER* and our last names hand-painted on them. But not enough of us had initially qualified to man ENTERPRISE using the Idaho Shift. Until a few more of our classmates could get qualified, we had to work two-14 hour shifts, seven days a week. No one that was qualified got any time off during that period. The only thing good was that we were hourly employees and the dollars really piled up when we worked more than eight hours each day, and especially on Saturdays, Sundays and Holidays.

In the middle of that six-week period, someone in higher management suggested that we be made salaried employees. We didn't have a union, but we did have leverage. All of us were young and impetuous, and a majority of the qualified STE's had Coast Guard-approved engineering licenses and could have gone back to sea. Recognizing that a reclassification simply to save money might result in wholesale resignations and stalemate the work on ENTERPRISE, wiser men, including Dick Broad, prevailed...

### ***History never repeated and an ultimate lesson*** \_\_\_\_\_

The story of the first refueling and overhaul of CVAN-65 is too long and too filled with unforgettable memories to include here. Suffice to say, we participated in a number of 'firsts' and managed to modify and refuel eight reactors, and overhaul four propulsion plants in about a nine months' period of time. In addition, a number of physical changes and additions were made. That complex feat has never been matched.

Because of my position as lead STE in the first propulsion plant on the schedule, I set an unenviable record; I wrote more On-the-Spot Changes to test procedures, when that proved necessary, and more Incident Reports when things went wrong than any other STE. To relate all that was involved in that often exciting experience is another story.

Once the ENTERPRISE work was finished, several of us moved on from test work to other activities. I had talked my way into a position on a project team doing conceptual design work for a two-reactor aircraft carrier. That work soon evolved into the detailed design of the first ship of the NIMITZ-class. I was able to apply my apprentice design skills and my test engineer experience to that effort, but that's yet another long story.

Some of my associates went back to Kaiser's Kollege of Knuclear Knowledge for an abbreviated refresher course and qualified as STE's for the LONG BEACH. Others went into submarine testing or other test programs, or back to design work. A few left the Company. But our places were soon taken by a host of additional young engineers, eager to get 'trained up' and become Shift Test Engineers. That process continues, even today.

Prophetically, the ultimate lesson in all this was summarized by Fred Kaiser in 1962, a couple of years before I was offered the opportunity to become an STE. In a presentation explaining the STE Program to the Virginia Society of Professional Engineers, he said:

*“A college-trained engineer may someday, after participating in test programs, return to design work with very vivid recollections of how at 3 AM something went badly or failed. Such experiences will make him aware that hardware does not always measure up and also why that is so. He will learn how to identify and fix deficient designs. He will return to the design office a much more qualified design engineer than when he left.”*

Fred Kaiser predicted my future.

### ***Postscript***

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The bane of every STE's existence was (and probably still is) a number of frustrations, all rolled into one nearly impossible task:

- Being held accountable for absolute safety and maintaining tight schedules, which often were at opposite ends of the spectrum of possibility
- Being allowed to do only what manuals and test procedures specifically allowed, flying in the face of conventional wisdom as to what testing is all about
- Being required to get five approvals from as many different organizations to make any changes to testing procedures when simple changes were obviously needed
- Being faced with refusal of waterfront trades to do planned work if they did not agree with certain test procedure steps requiring their assistance
- Being forced to watch the Navy's operating crew make mistakes, often after being warned, and then being the person who had to gather evidence and write a report
- Being second-guessed by Naval Reactors and Westinghouse observers whose comments often conflicted with one another and with our inviolate instructions

The worse frustration was NOT being allowed to operate the hardware. All of which led to this all-time favorite STE cartoon. I just wish I could claim to have been its creator.

