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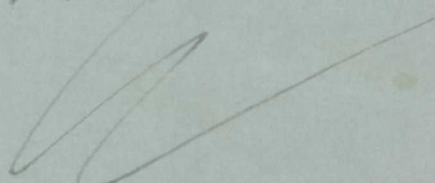
OFFICE OF PROCUREMENT AND MATERIAL  
CONSERVATION DIVISION STAFF CONFERENCE

April 1, 1944

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NAVY DEPARTMENT

OFFICE OF PROCUREMENT AND MATERIAL

CONSERVATION DIVISION STAFF CONFERENCE

April 1, 1944 - 9:30 A. M.

Speaker: Captain B. E. Manseau, Ship Salvage Branch, Maintenance Branch,  
Bureau of Ships

Subject: Ship Salvage

In Attendance:

Mr. D. L. Colwell, Coordinator of Conservation, Chairman  
Comdr. F. R. Baily, U. S. Coast Guard  
Mr. R. L. Blanchett, U. S. Coast Guard  
Lieut. (jg) A. J. Borinstein, Bureau of Supplies and Accounts  
Lieut. (jg) W. O. Brockert, Conservation Division  
Mr. W. A. Burton, Naval Gun Factory  
Mr. C. S. Cole, WPB Conservation Division  
Mr. H. C. Cooley, Conservation Division  
Mr. R. L. Coultrip, WPB Conservation Division  
Lt. Comdr. W. H. Creighton, Bureau of Ships  
Lt. Comdr. W. E. Davis, U. S. Coast Guard  
Mr. D. M. DeBard, WPB Conservation Division  
Mr. F. H. DeBay, Conservation Division  
Lt. Comdr. R. L. DeGroff, Conservation Division  
Ens. K. G. Ehrlich, Conservation Division  
Mr. L. H. Fawcett, Naval Gun Factory  
Mr. J. R. Fintze, WPB Conservation Division  
Lieut. (jg) K. S. Geiges, Conservation Division  
Mr. C. W. Gettys, Bureau of Ordnance  
Lieut. J. H. Gichner, Bureau of Ordnance  
Lieut. W. T. Golden, Bureau of Ordnance  
Lieut. C. P. Golding, Conservation Division  
Ens. A. C. Groeschel, Conservation Division  
Lieut. C. A. Hamilton, Materials Division  
Mr. P. Hitch, Conservation Division  
Lieut. H. G. Hughes, Bureau of Ordnance  
Lt. Comdr. R. W. Ince, Bureau of Ordnance  
Lieut. F. H. Jencks, Conservation Division  
Ens. L. B. Jordan, Conservation Division  
Mr. S. P. Kaidanovsky, Special Ass't, U. S. Dept. of Agriculture  
Mr. J. A. Kingsbury, Naval Gun Factory  
Ens. J. B. LaPointe, Bureau of Ordnance  
Capt. C. V. Lee, Bureau of Ships  
Lt. Comdr. J. S. Loewus, U. S. Coast Guard  
Maj. N. McKinney, Conservation Branch, Production Division, A.S.F.  
Mr. C. W. McVicar, Contract Clearance Division

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Lt. Comdr. W. C. O'Keeffe, Production Control Division  
Lieut. J. V. Powers, Bureau of Ships  
Lieut. O. C. Roehl, Conservation Division  
Ens. G. B. Russell, Materials Division  
Dr. J. P. Sanders, U. S. Coast Guard  
Mr. J. S. Sayre, Contract Clearance Division  
CPHM. N. Shapiro, Bureau of Medicine and Surgery  
Lt. Comdr. M. H. Shoemaker, Bureau of Ordnance  
Mr. G. O. Taylor, ARCO Conservation Division  
Lieut. J. K. Tindle, Bureau of Ordnance  
Capt. F. A. Tusler, Bureau of Ships  
Lieut. B. L. Verner, Bureau of Supplies and Accounts  
Mr. C. A. Willson, WPB Conservation Division  
Comdr. S. J. Woyciehowsky, U. S. Coast Guard  
Lieut. H. P. Wright, Production Control Division  
Mr. V. M. Zaffarano, WPB Conservation Division

MR. COLWELL: Shall we come to order please. This morning we are to listen to one of the different aspects of conservation. Conservation has been considered in the early days of the war particularly as substitution of a less critical material for a more critical material. During the past few months, particularly, that phase of it has become less and less important. We have had at our Saturday morning meetings people on aluminum and on copper, etc., and our booklets on materials have pointed out that they are not in many instances as desperate as they were in the early days of the war. However, there is still a large job -- a big job to be done in conservation in such matters as a more efficient manufacturing process -- in such matters as more efficient utilization of the materials that we use in such things as the reuse of materials that have been used once and are not entirely destroyed.

It is that reuse aspect that we are going to speak of this morning, and, of course, this is in its most spectacular phase. You're familiar with how the NORMANDIE was burned and capsized in New York and was raised. Captain Manseau was in charge of that operation. This morning he's going to tell us something even more spectacular, and that is the aspects of the salvage and raising of much of the damage that was done at Pearl Harbor. We'll start with the picture. The picture is an official Navy film which shows what happened at Pearl Harbor. Part of it at least was actually taken on the scene, and after the picture is over Captain Manseau will tell what happened after this damage was done, so if you'll turn out the lights over there please, we'll go right ahead with the picture.

. . . Thereupon followed a showing of the film

"December 7" . . .

MR. COLWELL: It is a privilege now to present Captain B. E. Manseau --  
Captain Manseau. (Applause).

CAPT. MANSEAU: Thank you, gentlemen. As Mr. Colwell indicated, the work after December 7 was practically entirely a matter of conservation or rehabilitation of what we had left. You saw from the picture that there was a tremendous amount of damage done to ships in the harbor. Fortunately for us, the damage was largely confined to ships in the harbor, and the yard was intact except for relatively minor damage considering what they had done and what they could have done.

The yard itself suffered damage only in these respects. The greatest damage was possibly the sinking of the floating drydock, the burning to a crisp of one drydock crane and more or less minor damage throughout the yard in the line of ruptured power connections, water mains, etc.

On December 6 the yard was chock full of ships. We had twenty berths along the waterfront. Each berth had anywhere from one to four ships in it -- four ships abreast in a good many cases. Had the Japs concentrated on those ships, we would have had no waterfront. Therefore, the work in the yard would have been seriously hampered. Likewise, they didn't touch the fuel oil tanks of which we had a considerable number in two large tank farms which if hit could have overrun the yard with fuel oil fires. As we found out, fire is one of the greatest hazards in modern war. The power plant was intact. So before the attack had finished, we knew that we still had a Navy Yard.

There was quite a bit of disorganization and confusion, but before the bombs stopped dropping, people were back to work. It didn't take long for people aboardship to find out, as I stated that one of the greatest hazards was fire. Other hazards were overweight on the ships -- excess weight. As a result, practically every ship in the yard threw over everything that was portable that they didn't absolutely need. Before the seventh, we had quite a bit of difficulty convincing ships they should get along with fewer boats -- and along without a lot of things considered luxuries in wartime. On December 7th we didn't have to convince them. As a result, all piers and accesses were cluttered up with things thrown overboard from ships -- powder cans, furniture, everything under the sun. We immediately called in all the laborers, riggers and transportation people and started clearing up the accesses so we could go to work.

Prior to the seventh and for some time during the emergency preceding the seventh, we had been working full blast seven days a week, three shifts a day, performing alterations and repair work on the ships of the fleet as had been recommended by the so-called King Board. However, even though we thought we were working full blast, I am sure that the output was redoubled beginning on the seventh. We went immediately to two-twelve hour shifts as long as I was there -- till the end of March. How long they continued after that, I don't know.

A good example of how the yard output increased was clearly brought out by one little case. -- As I remember clearly, on December 6th we had a conference and tried to figure out ways and means of completing two cruisers within three weeks. They were getting some radar installations. It was finally concluded that only one of them could be completed in three weeks; the other had to take six. We wanted to get both out in three weeks. No one paid much attention to that job, but on the fourteenth of December, just about an even week later, both ships left the Navy Yard completed.

Most emphasis -- at least in the newspapers -- has been placed on the so-called salvaging of big ships like the CALIFORNIA, WEST VIRGINIA, NEVADA, OKLAHOMA, etc. I don't think there is any question that most of the important work done immediately after the seventh was the work of completing ships under overhaul, repairing the ones damaged and getting stuff out that was in shape to go to war in the shortest possible time.

The damage done to the ships in the harbor was about as follows -- (it's all been in the newspapers, but I will just repeat it for the moment):

CALIFORNIA: Damaged and sinking. About a week later she went all the way down.

WEST VIRGINIA: Sunk.

OKLAHOMA: Sunk and capsized.

UTAH: Sunk.

ARIZONA: Completely wrecked.

NEVADA: Stranded -- sunk and stranded.

Three battleships, the MARYLAND, TENNESSEE AND PENNSYLVANIA: Each suffered direct bomb hits.

HELENA: One torpedo hit -- one engine room and one fireroom flooded.

RALEIGH: Practically sunk but really afloat. I don't know what kept her afloat. She carried fuel oil to within ninety-five per cent of her capacity -- at least. She received a torpedo in her machinery spaces which caused two firerooms and one engine room to be flooded. She had a bomb aft which flooded everything aft with the exception of the starboard shaft alley. The RALEIGH sank until the main deck was awash on one side. What saved her perhaps was that she touched bottom -- that with the fact that the ship's force went to work and threw everything overboard thereby providing stability which saved the ship from capsizing.

The VESTAL, a repair ship, had two direct hits, one of them that exploded in the forward hold; another aft which went right through the bottom, exploded on the outside and blew up part of the bottom. She settled in the mud in shallow water.

CURTISS, aircraft tender: -- had a direct bomb hit in the way of hangar space aft.

CASSIN and DOWNES, two destroyers in drydock No. 1, along with the PENNSYLVANIA, were practically completely wrecked. They suffered severely from several bomb hits -- later from fire and explosions in their own magazines. The PENNSYLVANIA suffered two bomb hits. The floating drydock, which was a yard facility, was hit at least twice and suffered some more damage when the SHAW, which was on the blocks, was hit, setting fire to it. The fire caused the forward

magazine to explode which, in turn, blew the ships bow off. The result was that the floating drydock sank. The stern of the SHAW stayed afloat, but the bow went down with the drydock.

I think that's about the sum total of all the damage.

Now, the yard was faced, of course, with the proposition of trying to get things back in shape as quickly as possible. We couldn't afford to worry about things we couldn't do anything about. We couldn't worry about long-time jobs at the moment, but went ahead and established a priority list designed to get ships operating as quickly as possible.

We had under construction a new graving dock -- drydock No. 2 which was not yet completed. Back in July the Manager was worried about what might happen in the future, so directed me to take steps to have the drydock completed in such order that should something happen, we would be in a position to dock a battleship even though the dock were not completed. That was very fortunate because on December 7th we had only the center section of the floor of the dock completed. All around this center section, near the side walls, concrete had been poured, but there was a complete floor along the center line for six hundred feet -- just enough for a battleship. The caisson was in, but there was no pumping plant.

Anyway, we decided that the first ship we would put in the drydock would be the HELENA. We put her in on December 10th. She had a torpedo hit in the way of the engine room which completely flooded and demolished one engine room and one fire room. She still had one engine room and one fire-room left. That caused her to settle from two feet to two and a half feet in water. We brought her in on the tenth of December and found that a twisted mass of wreckage in way of the damage -- you couldn't tell the condenser from the reduction gears. It was evident that we couldn't completely repair the ship at Pearl because of the lack of machinery parts, so we put a temporary patch over the opening. To look at it when done, it looked like a permanent patch from the outside but it was only temporary construction. It had to come out again in order to remove wrecked machinery on the coast. By so doing, we got her out of drydock the twenty-first of December, and she left for the west coast. She acted as escort to a convoy. She could make from twenty to twenty-five knots and escorted a convoy back to the coast and went into the yard there for completion of repairs and for alterations which, when completed, made her one of the best cruisers we had. So the work at Pearl Harbor was done before a month was up and the ship was gone.

In drydock No. 1, in the meantime, we had put in the HONOLULU. I forgot to mention we had the HONOLULU as a damaged ship. The damage was forward in the way of magazines. A near miss had indented about thirty feet of the shell plating about two feet. Some pipelines near a sea chest were ruptured. She went down by the bow two or three feet. We ran her in drydock No. 1, which was our old dock, on the twelfth of December. She left the drydock on the twelfth of January. She was completed a hundred per cent and just as good as she ever was and went out to work immediately.

In the case of the battleships damaged and not sunk, the TENNESSEE, MARYLAND, and PENNSYLVANIA, they were all completed -- all traces of the damage done were gone with the exception of a little in the MARYLAND and some fire damage on the TENNESSEE. The PENNSYLVANIA was completed one hundred per cent. The TENNESSEE was completed except for some of the fire damage. The

MARYLAND was completed except for fitting out the interior of one of the holds where a bomb had entered and exploded on the inside. There was no water in the ships. They departed soon after the twentieth. What happened then -- maybe you know; maybe you don't. Besides completing the repairs, they did get some alterations which had been in the wind for some time. When they left the yard, they were practically as good as new battleships we are building now.

That covers the HELENA, the HONOLULU, and three battleships. The CURTISS was needed for some hurryup work transporting planes. We got that ship in the Pearl Harbor Yard on the nineteenth of December. On the twenty-seventh of December she was done and went about her business of transporting planes.

The RALEIGH followed the HONOLULU in the drydock. She was very extensively damaged. We got her in on the twelfth of January, I believe it was, and she went out of the dock about the thirteenth of February. In that case, I think we had the biggest job of any that we had had to date because forward where she received the torpedo -- the ship's sides had two courses of special treatment steel armor, about an inch and half thick or inch and a quarter thick. We had no STS in the yard -- at least, not enough to do the whole job, so had to take the bent armor off the ship, straighten it, fair up the holes, build new frames. That was strictly a case of conservation because if we didn't use old material, we wouldn't have been able to get the ship out. That was one of the biggest shipfitting jobs we had, and it was a big one! She left the yard about the middle of February under her own power to get some of the machinery we couldn't furnish. Her hull was one hundred per cent complete.

The VESTAL is a repair ship. The emergency repair work on her had been largely done by the ship's force. She was rather low on the yard's priority list but the ship's force couldn't stand by idle so they did their own work. When they came into the yard, they came in only for permanent underwater repairs which had to be done in drydock. Five days in drydock and she was done.

While this was going on, of course, we still had repair work on another twenty or twenty-five ships, and we had to assist the salvage people in getting organized to do the major salvage work. We, also, had to take care of ships that went to war and came back damaged. Between the HELENA and VESTAL which both went into the same drydock, we had to take an aircraft carrier which had been recently torpedoed. We sandwiched her in between some of the damage jobs. It was a matter of establishing priority according to urgency or benefits to be obtained. The people in the Navy Yard frankly didn't pay too much attention to the jobs out in the harbor (which were more or less long time matters) -- until most urgent work was cleared up.

The salvage of the floating drydock was probably one of the most striking examples of effectiveness of manpower and equipment. The SHAW, as I stated, was in her when bombed. A raging fire on the ship burned one side of the dock to a crisp. Eventually, the dock sank and was completely submerged. It appeared at first to be a long time job. We had plenty of other things to do so didn't worry too much about it until some of the other stuff was out of the way. Around the middle of December -- it seemed ages because we were working around the clock -- it looked like, if we went about it in the right way, the



drydock would come up. We needed docking facilities very badly. Except for the original graving dock and the new one, which was not quite completed, we had only the marine railway which was in continuous operation and the floating drydock which was sunk. After a quick survey, it was decided we could pump the water down the inside walls until the water was below the machinery deck. All the machinery inside the side walls is up on a fairly high level. By keeping the water inside below the machinery deck, we were able to overhaul all auxiliary machinery, boilers, pumps, etc. We had to build cofferdams around the hatches so that the water wouldn't run down. Incidentally, this dock was only about a foot under water, so we just had to build cofferdams so high. We didn't bother to permanently patch the holes in the side walls but just plastered canvas over or put a wooden plug in the numerous small splinter holes so we could pump down. With the machinery spaces dry, we went ahead with the overhaul of machinery. As soon as we had one pump on each side working, we went ahead and pumped her up. Finally she came up and we saw where the major holes were. Of course, a floating drydock, being a buoyancy affair anyway, can have quite a bit of damage before it will sink -- or the other way around -- it can still have quite a bit of damage and you can still get it up. All we wanted to do was get it up to where most of the sidewalls and part of the main deck were out of the water.

We found that two bombs had gone right through the main deck of the center pontoon, or main buoyancy chamber, of the structure. We found that we could get the dock high enough to temporarily repair the main deck -- that is the upper boundary of the pontoon. We did that, and then we figured that we could dock a ship, and while this ship was in dock do some more repairs. Having completed repairs to the main deck leaving the bottom wide open, we submerged her and set blocks to take the SHAW -- that's the ship that was in her at the time of the attack. The SHAW had, in the meantime, gone on the marine railway where wreckage was trimmed and measurements taken for a false bow. This bow was built, temporarily secured to the SHAW and the two towed to the floating drydock. Thus the first docking after salvage of the dock involved the ship which was wrecked with the dock at the time of the attack. While the false bow was being securely welded in dock over a period of five days, permanent repairs were made to numerous holes in the structure which had been only temporarily repaired for the first pumping. Also during this period permanent repairs were made to a major rupture in the after portion of the main deck of the center pontoon.

The next docking was the routine overhaul docking of a submarine which required about three weeks. We set blocks on the floating drydock in that case so the submarine would be over the newly repaired after portion of the pontoon, leaving exposed the forward section where the bottom was still missing as a result of the explosion which blew off the SHAW's bow. Well, while the submarine was in dock, we repaired and overhauled it, and when the sub went out three weeks later, the floating dock was just about one hundred per cent complete. The bottom, in way of the explosion damage forward, was repaired by submerging a box-like patch, large enough to surround the damaged area, centering it under the opening and releasing weights so that the edges of the box bore against the underside of the bottom plating. By making the contact points tight water could be pumped out of the interior flooded space so that workmen could make complete permanent repairs from inside. Temporary openings had to be cut through the newly repaired main deck to admit structural steel and equipment but that was a simple matter. I think that about covers

most of the repair work incident to the December 7th attack except for the CASSIN and Downes.

The important thing to remember is that while this repair work was going on, we still had a full load of current work, overhauls and repairs to damage being done during that period. In the first raid on the Marshalls and the Gilberts and also that on Marcus Island resulted in some which had to be repaired. Everything was urgent and all worked under high pressure. I have never seen people work as hard anywhere as they did there.

For one thing -- the Navy Yard workmen were not unionized. The working force included a considerable number of supervisors and men who were ex-Navy men. Even the contractor's people -- the Pacific Bridge Company's people -- didn't observe union rules. Eight hour days and the clock meant nothing. They all came in to work on the 7th and when dark came, they couldn't go home because there was a blackout. Even if they did they couldn't get anything to eat as there were no stores open. People worked all day, slept aboard the ships at night and ate where they could. That went on pretty close to two weeks. Half of the people in the Navy Yard just lived on the job. They didn't bother to go home. The night shift could get in before dark and leave after dawn so they could travel back and forth. But most of them preferred to stay on the job in the Navy Yard.

In the case of the CASSIN and DOWNES -- they were pretty completely wrecked. They were in drydock, and the damage sustained as a result of bombs, explosions and fire was somewhat increased incident to flooding of the dock to extinguish the fire and protect the PENNSYLVANIA, also in dock. We couldn't take time out to worry about them because the PENNSYLVANIA was in the dock with them, and when it came time for the PENNSYLVANIA to go out, she went out. In flooding the dock, of course, the destroyers became submerged and as a result, suffered a little more damage. They were so far gone, it was decided to limit work on them to that necessary to clear the dock. While the RALEIGH job was being done, in dock, we patched them up so they could be floated out simultaneously with the completed RALEIGH, thereby allowing us to use the entire facilities in drydock No. 1 thereafter. As long as the CASSIN and DOWNES wrecks were in the dock, all we could dock was one cruiser or battleship. With them out, we could dock two destroyers and a battleship or cruiser.

In the case of the CASSIN and DOWNES, the hulls were so far gone we couldn't use them so we decided to remove all the useful parts. There was a unit at the Navy Yard sent out shortly after the seventh called the Ship Repair Unit, made up of enlisted men and officers -- about a thousand in number all told. They went to work taking out all the machinery that was worth-while reconditioning. As far as possible reconditioning was done by them. Items not within the capacity of ship repair unit were done in the Navy Yard Shop. Much of the machinery was later sent back to Mare Island and put into the rebuilt destroyers, CASSIN and DOWNES. A small part of the structure was retained. I don't know just how much. Even though largely new, there were still enough CASSIN and DOWNES parts used to warrant retaining the names, CASSIN and DOWNES.

Now, all that work that I have just described, including the refloating of the NEVADA, was done within two months -- two months and a week after December 7th. What was left to be done after that was the refloating

of the OKLAHOMA, CALIFORNIA and WEST VIRGINIA. The OKLAHOMA you probably know -- was refloated in March. As I stated, it took some little time for the CALIFORNIA to sink. She suffered from hits by two torpedoes, near misses from a couple of bombs, fire damage and two direct hits from what appeared to have been small bombs. As a result, she sank. She sank so that her main deck was under water. Several schemes were proposed for getting her up. One scheme was to build a sheet piling cofferdam entirely around the ship, thus enclosing it in a basin, pumping out the basin, repairing the damage and then refloating the repaired vessel by admitting water. That wouldn't work for many reasons. The main reason that made it impossible was that the corral bottom was so porous that it would not have been possible to pump out the enclosure sufficiently to get at the damage. An old method in salvage is to build a so-called fence type cofferdam around the deck edge, thereby extending the ship's sides above the waterline and pump out the interior. The ship will float and stay upright if you are careful about stability. This method was used for the CALIFORNIA. The forward part was already above water. No patching was done -- at least none to speak of. The doors were closed -- watertight doors in the interior of the ship were closed, and the ship was just pumped out without doing any extensive repairing and brought into drydock somewhere around the end of March or early in April. She was sufficiently repaired in drydock to enable her to go back to the coast for further repairs and for alterations.

In the case of the CALIFORNIA, as well as the WEST VIRGINIA, which was similar, the ships had electric propulsion plants. There was considerable doubt that the propulsion plants could be reconditioned without completely rewinding and breaking down the laminations for re-insulating. It was finally decided to do just that. The people didn't feel they could take a chance on such an important unit failing at a critical moment, so the power plant was completely reconditioned, starting from scratch, using the same copper, but completely re-insulating and rewiring. In the case of auxiliaries, on the other hand, anything that hadn't been submerged too deeply was reconditioned without rewiring or re-insulating. They were washed out -- baked out in a large number of cases, repainted, etc., and apparently have stood up. The important wiring was in every case completely removed. Capillary attraction had caused water to seep quite some distance along the wires, and again -- it not being considered wise to take a chance on power failures -- the wiring was in most cases renewed. Practically all the mechanical equipment, including gauges and the like, was repaired. A lot of people thought that the gauges and intricate mechanisms would have to be renewed completely, but the shops went to work on them and found they could rebuild these satisfactorily from recovered parts and a few new ones.

The WEST VIRGINIA was somewhat similar to the CALIFORNIA except a bigger job. The WEST VIRGINIA had at least four torpedo hits and two other hits which might have been torpedoes or bombs; that is, under water. Then she also had a couple of direct hits. In that case, it was impossible to pump the ship out without doing some patching, so two of the largest holes were patched by means of underwater patches -- patches built on the surface, slipped down, fitted to the ship's sides, sealed with concrete.

You can hardly imagine what the interior of the ships looked like. It was a complete mess. You could hardly look at the stuff without getting sick or dirty. There was a tremendous amount of clean-up work to be done.

Everything was absolutely covered with oil. In the good old days it used to be considered a sacrilege to get oil in a drydock and a sacrilege for a ship to be run aground or to sink in a harbor. There, the woods were full of them!

On the first day our drydocks were so full of oil, nobody worried about oil thereafter, except for possible fire hazard which wasn't so great as we had previously thought. In doing repair work half the time was consumed in clearing away wreckage. You couldn't take much time cleaning off oil. It was washed down with a hose until all the loose stuff was off. We then started burning. Every time we started a fire, we put it out. In the good old days we would have cleaned the old oil off with rags and have taken such precautions that it would have taken ten times longer to do a job.

In the case of the WEST VIRGINIA, as I say, it required patching and also a partial cofferdam. That ship was pumped out and run into drydock about June. Anyway, about the time July rolled around there wasn't anything left to be tackled except the OKLAHOMA, and -- well, we now know that the OKLAHOMA was righted, refloated and put in drydock about a month ago. What's going to be done to her in the line of repairs, I don't know.

The last job then is the UTAH. She has just been righted and for the time being is going to stay where she is because she's of no military value, and it's obvious that if we let her stay there, she's not in the way.

The ARIZONA is one complete wreck and will stay wrecked. As far as I know she will be there from now on. Summarizing the bulk of the important work, as I see it, was done in the first two months or first two and a half months. The few long time salvage jobs, of course, took longer as did the rebuilding and modernization of older ships into ones as good as new. By saving old ships and equipment, we got ships in service much quicker than we could have by starting from scratch and building new ones. Here it is a little over two years after December 7th, and most every one of those ships we contemplated putting back in service has been in service for some time. In fact, some returned to service have been in several battles and have suffered damage since then, and some have been lost. Well, that's about as much of the story as I can give in a half hour's time.

MR. COLWELL: Thank you very much, Captain. We heard last Saturday that two of those ships, the PENNSYLVANIA and the MARYLAND, I believe it was, were up at the Marshalls covering the demolition squads on shore, so there's one minor instance, one small instance at least, where we know what they did after you put them back again, and there are undoubtedly lots of others. Have you any questions you'd like to ask Captain Manseau?

MR. FAWCETT: When you pump those vessels out, how do you attach that material -- attach it to the deck?

CAPT. MANSEAU: Cofferdams?

MR. FAWCETT: Yes.

CAPT. MANSEAU: Cofferdams are built in the sections topside, usually out of timber and are attached either by hooking to the ship's side at the

deck-edge or by bolting. They are fastened to the ship and then made tight at the joints by stuffing in rags, oakum, etc., or covering the joints with canvas or sheet rubber.

MR. FAWCETT: They're just made out of lumber?

CAPT. MANSEAU: Lumber, yes. There are several schemes for attaching them, but there are all sorts of ways of improvising. The job is to get temporary tightness. That's all we want so we won't have to pump out too much.

LIEUT. JENCKS: How long will it take to pump out one of those? Is there a large variation in time?

CAPT. MANSEAU: Oh yes. Of course, I wasn't there when those ships were pumped out. I left in March, but I have seen a lot of ships pumped out. Well, it takes anywhere from -- depending on how you are fixed -- two hours to maybe a couple of weeks. I'll give you one good example. We had a ship completely sunk with twenty feet of water over her in Buzzard's Bay. We had to cofferdam around the cargo hatches -- each cofferdam about the size of this room -- fitting just around the hatch coamings. When meant that with cofferdams installed the ship's water tight envelope consisted of the ~~bottom~~ and side of the ship to the main deck, the main deck to the cofferdams and the cofferdam or box sides to the water's surface. In order to get the ship up we had to pump between tides. We had to commence pumping out at the beginning of low tide, the whole pumping to be done in five hours. We had to get the ship off the bottom and the main deck up before the tide rose any appreciable amount. At that place the range of tide was about six feet. Another six feet added to the twenty already on would have collapsed the decks were the ship to remain on the bottom with any water below decks pumped out. It took four or five hours. In the case of the CALIFORNIA and WEST VIRGINIA, I'd say it took considerable time to pump them out because a great deal of preliminary exploratory and test pumping, which contributed to the final floating, was done before continuous pumping with the definite expectation of floating was undertaken. Explanatory pumping in various subdivisions of a ship is done for the purpose of locating leaks and determining the number of pumps required. A compartment found to be tight or made tight may be left empty or may be allowed to refill until in readiness for the final pumping. In the case of those ships, the job was progressive. You couldn't say at any one time, "I'm going to pump and refloat the ship up today." I would say that when they figured the ship was in shape for floating, they probably pumped about two weeks. That's just a guess.

MR. COLWELL: After a ship is raised, Captain, the small items -- the cable, for instance, and the electric fittings and valves, etc. -- I suppose the electric cable all has to be replaced when it's been under water for any length of time?

CAPT. MANSEAU: Yes, they've gone to that policy.

MR. COLWELL: But many of the mechanical parts --

CAPT. MANSEAU: The mechanical parts are invariably O. K. -- that is, if steps are taken to preserve them on their contact with air. In the case of Pearl, there was so much fuel oil which coated everything it acted as a preservative in the case of machinery. In the case of wood, canvas -- stuff like that -- the fuel oil caused it to deteriorate.

MR. COLWELL: Are there any other questions? If not, then I want to express our appreciation to you, Captain. It's been a privilege to hear you and we hope maybe another time we can ask you more about the LAFAYETTE or the NORMANDIE. Thank you very much. (Applause).

May I just make an announcement that the rubber talk has been postponed till sometime in May -- Mr. Babcock of the Rubber Director's office. In the next three weeks, we're going to have -- not necessarily in this order -- "Smaller War Plants," "The Petroleum Administration," and probably as a substitute for the Tarawa film, which is of confidential nature, we will have the film "The Battle of the Beaches." On the twenty-ninth, Lt. Commander Gardner, who has just come back from the Pacific, is going to talk to us about the "Spare Parts Situation." The meeting is adjourned.

. . . Thereupon the meeting adjourned at 10:30 o'clock . . .

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