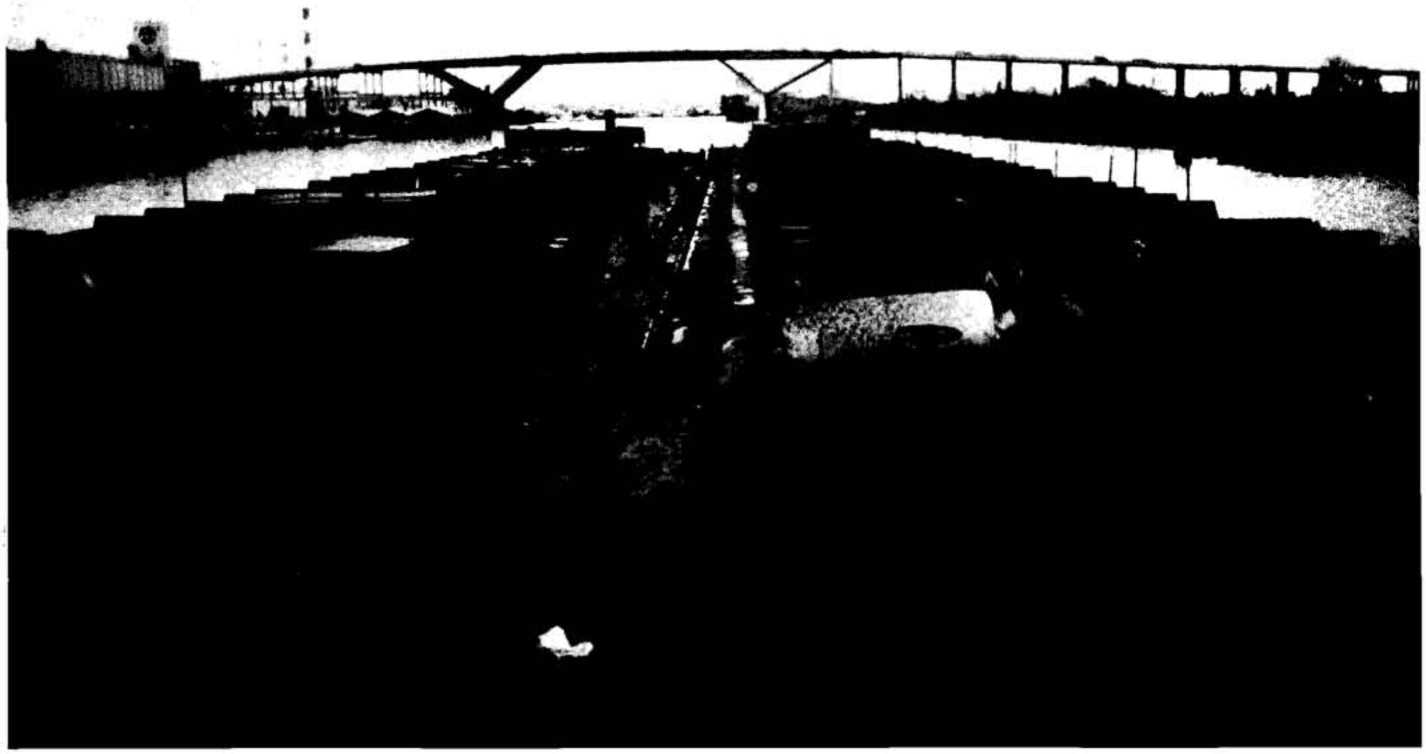
Proceedings

of the Marine Safety Council

Vol. 42, No. 9



United States
Coast Guard

October 1985

Proceedings

of the Marine Safety Council

Vol. 42, No. 9

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Cover

Two 210 x 60-foot chemical barges are pushed through the narrow Houston Ship Canal. Notice how the blind spot obscures nearly all the area in front of the bridge. LCDR Christopher Walter and LT Roy Nash discuss the blind-spot hazard in their article on page 211. Official U.S. Coast Guard photo.

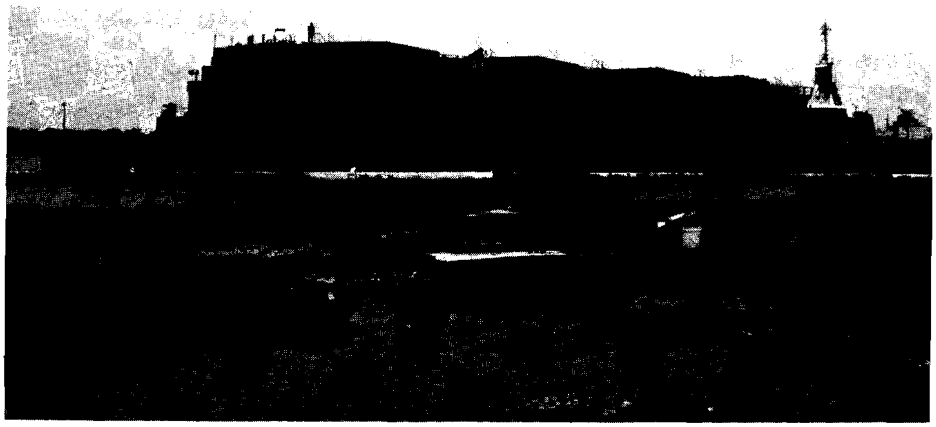
Blind Spots in Front of Tows

LCDR Christopher Walter
and
LT Roy Nash
Marine Safety Office Hampton Roads
U.S. Coast Guard

In the early morning of a summer holiday weekend, a large combination deck hopper/tank barge was loaded with 7,000 tons of fertilizer at a facility on the James River in Hopewell, Virginia. The barge was 302 feet 9 inches in length, had a 90-foot beam, 18-foot draft, and approximately 4 feet of freeboard. An unusual characteristic included an externally framed cargo superstructure that extended over 37 feet above the waterline.

The barge was pushed down the river by a 3,900-horsepower tug that had two pilothouses, one of which was elevated to enable the licensed operator to see over barges that he was pushing. The height of eye above the water for a man 6 feet in height when in the upper pilothouse was 41 feet 7 inches.

The tug had a crew of six men, which included two licensed operators of uninspected towing vessels and two deckhands. It was the practice on this vessel to have a licensed operator on watch, assisted by a deckhand. The duties assigned to the deckhand included acting as bow lookout when directed by the operator.



Note the height of the superstructure in relation to the height of the tug. Official U.S. Coast Guard photo by LT Roy Nash.

A Drifting Pleasure Boat

Late that morning, a pleasure boat departed a small boat harbor in Newport News, Virginia for a day of fishing in Hampton Roads. There were three men on board, two of whom were in their seventies. The three men were drift fishing in the vicinity of several other pleasure boats for several hours and eventually entered Newport News Channel that afternoon. There were between 25 and 100 other boats in the immediate area that were also taking advantage of the pleasant holiday weather.

At 1545, the loaded fertilizer barge was being pushed through the James River Bridge approximately 4 miles upstream from the drifting pleasure boat. Several witnesses later stated that they had watched the barge for as much as a half hour because of its unusual structural configuration. Some of the people who first observed the barge speculated that it was carrying a section for an underwater tunnel. None of these witnesses saw a lookout on the barge.

As the barge continued to approach the drifting pleasure boat, a crewman in a sailboat crossing Newport News Channel saw the tug, its barge, and the pleasure boat all lined up. He also saw the drifting pleasure boat disappear into the shadow of the barge. At the same time, he could not see the upper pilothouse of the tug due to the height of the barge it was pushing. He could only see the mast and antennae of the tug.

Another witness saw the pleasure craft disappear beneath the bow of the barge and pop back up approximately halfway down the port side of the barge. Several boaters went to the assistance of the sunken craft and rescued two of the three men who were on it. One of the rescued men had to be resuscitated for 20 minutes before he started to breathe on his own. One man was uninjured. The third man died.

The tug and barge continued down Newport News Channel, its crew unaware of the tragedy and drama taking place in its wake. Another boater, angered at the failure of the tug to stop and render assistance after the collision, pursued and hailed the tug and eventually caught the attention of a deckhand stowing lines on the barge. The crewman, startled by this information, hurried to the pilothouse to advise the operator of the collision. The tug and barge traveled over a mile before they stopped and anchored.

The operator of the tug immediately notified the Coast Guard of the accident, and an investigating officer was dispatched to the scene. After investigation, the decision was made to charge the operator under the provisions of Title 46 United States Code 7703 for misconduct for failure to take action to avoid a collision and failure to sound appropriate maneuvering signals. The operator was also charged with negligence for failure to maintain a proper lookout.

The operator's failure to sound appropriate maneuvering signals and to take action to avoid a collision were easily established through the testimony of the numerous boaters who witnessed the collision. The lack of a lookout on the barge was also easily established using the testimony of the deckhand who was stowing lines on the barge and the testimony of the witnesses in the small boats.

Could the Lookout See?

The proof for the charge of negligence for failure to maintain a proper lookout revolved around showing that the operator of the tug was not in a position to be that proper lookout. Both licensed operators on the towing vessel estimated the blind spot in front of the pushed barge to be approximately 300 feet. Using arrangement plans for the towing vessel and the barge, the Coast Guard investigating officers attempted to show, with algebraic calculations performed by an expert witness, the magnitude of the blind spot in front of the barge. The length of this calculated blind spot was a staggering 1,746 feet. This distance was nearly six times the estimate provided by the licensed operators of the tug. The total horizontal distance from the operator in the upper pilothouse to a point where his line of sight intersects the water was 2,037 feet.

Calculating the Blind Spot

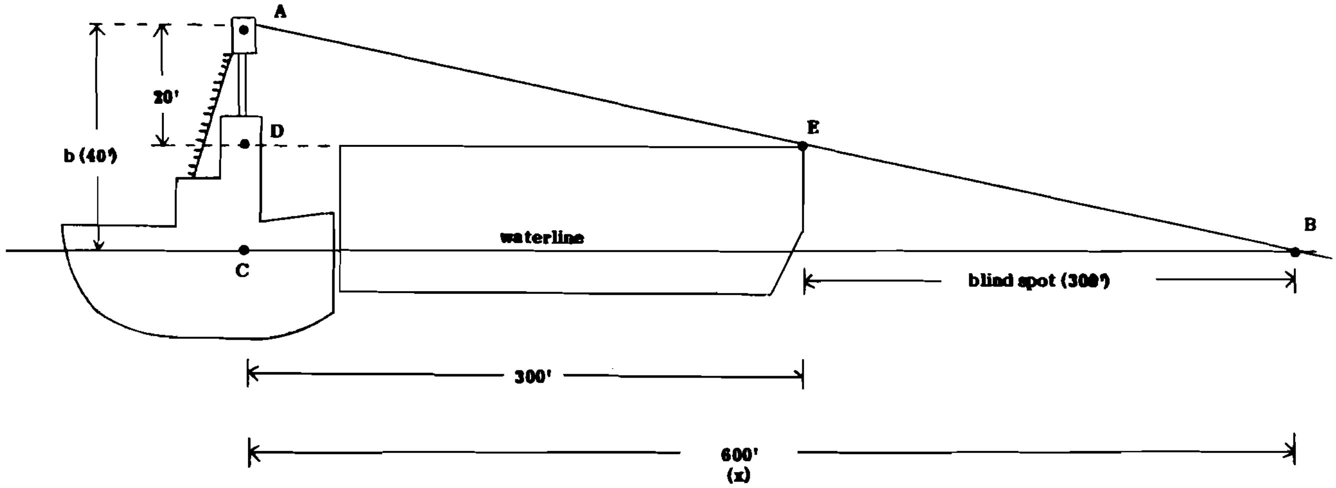
There are two methods of obtaining the measurements needed to calculate the longitudinal extent of the blind zone dead ahead. The first is to actually measure the dimensions of the barge and the tug. The second is to take measurements from plans of the vessels. Of the two, actual measurements are preferred since vessels are not always built strictly to plans.

There are also two methods of calculating the length of the blind spot in front of a barge. The first one, calculation by algebraic formula, was the one used in the suspension and revocation hearing. It is based on the formula $Y = mX + b$; where X is the horizontal distance from the operator to where he can see the water in front of the barge, m is the slope of his line of sight, and b is the height of the operator's eye. Referring to figure 1, the slope (m) is determined by the change in the y coordinate divided by the change in the X coordinate. In the case of the hypothetical example in figure 1, the height difference between the operator's eye in the pilothouse and the height of the forwardmost obstacle to the operator's vision on the barge divided by the horizontal distance between the two will provide the slope (m) for the equation. The total height of eye of the operator (b) is an actual measurement. To find the horizontal distance X using this formula, set Y equal to zero and solve in the following manner for the value of X:

$$Y = mX + b$$
$$\emptyset = mX + b; \text{ where } Y = \emptyset$$
$$mX = -b$$
$$X = -b/m$$

Using the figures in the hypothetical example in figure 1, the slope is the difference of the operator's height of eye and the height of the forwardmost/constraining obstruction on the barge (20 feet) divided by the distance between these two points (300 feet). The slope is, therefore, 1/15; the

Figure 1



height of the eye of the operator in this example is 40 feet. This height of eye (40 feet) divided by the slope (1/15) will give the distance, X, from the operator's eye to the point where he can first see water in front of the barge, in this case 600 feet. To obtain blind spot in front of the barge, merely take this distance (600 feet) and subtract the horizontal distance from the operator's eye to the bow of the barge, 300 feet, to arrive at 300 feet of blind spot in our case.

Another way to calculate the total distance from the operator to where he can see the water is to use the geometry of similar triangles. From figure 1, triangle ABC is similar to triangle AED. Therefore, proportions of sides AD and DE are similar to AC and CB. Side AD divided by AC will equal side DE divided by CB where CB is the total horizontal distance from the operator to the point at which he can first see the water. In this case,

$$AD/AC = DE/CB$$
$$CB = (DE \times AC)/AD$$
$$CB = (300 \times 40)/20$$
$$CB = 600 \text{ feet}$$

The Legal Decision

At the conclusion of the hearing, the Administrative Law Judge issued his written decision in which he stated "That recreational fisherman, as here, may mistakenly drift within the channel markers is a clearly foreseeable circumstance and every effort must be made by a tugboat [operator] pushing a barge severely limiting his visibility to warn such vessels of his approach." The Administrative Law Judge also stated that "...examination of the configuration of the barge and the extensive blind spot in front of it reveals that the importance of a lookout in this situation was absolutely imperative and this failure to station a lookout reflects the highest degree of negligence on the part of the respondent." The Judge's decision went onto state, "Why this respondent attempted to navigate the Newport News Channel on this clear holiday afternoon without a lookout is without explanation on this record. Such conduct is manifestly unseamanlike and on this record constitutes gross negligence."

The Administrative Law Judge revoked the operator's license and suspended his Merchant Mariner's Document outright for a period of 12 months.

This casualty and the subsequent suspension and revocation hearing clearly point out the need for lookouts when the operator's vision is obstructed by his tow. It is also imperative that operators do not rely on their own estimates of the blind spot in front of their tows, since this case demonstrates that these estimates can be dangerously in error. We hope this discussion will assist others in determining the blind spot in front of tows and prevent similar tragedies in the future. ‡

The Coast Guard Reserve Protects the Space Shuttle

LT Samuel J. Korson
U.S. Coast Guard Reserve

In 1981, on the eve of the launching of the first space shuttle **Columbia**, it became apparent that security was going to be of some concern. When the shuttle is sitting on its pad, it is as vulnerable as a newborn baby. Although the surrounding terrain is exceptionally hostile to humans, there is always the chance that someone could disrupt a launch via the water. The National Aeronautics and Space Administration (NASA) sought a way to safeguard its investment at a reasonable cost without compromising the safety net that is desired.

The Kennedy Space Center (KSC) is located at the northern end of Merritt Island, Florida, which is bordered on the east by the Atlantic Ocean and on the north, south, and west by inland waters. What NASA required was a force that would be able to keep people away from the Space Center's secure areas during a launch, or at best, to keep them at a safe distance. They needed personnel who were highly qualified in running small boats (41-footers and smaller) through mazes of inland waters and who were certified in various small arms training, with the discipline not to shoot at the smallest provocation. They were looking for highly dedicated, motivated individuals who could run radar scopes, stand NASA liaison watches, and do a myriad of other duties connected with the launches. They turned to the Coast Guard.

When NASA contacted the Coast Guard for security zone assistance, the officer-in-charge at Coast Guard Station Port Canaveral wanted to help, but the manpower requirements were too much for his crew. Further discussions with Commander, Coast Guard Group Mayport and the Operations Division at the Seventh District office resulted in the same problem. The Coast Guard, already undermanned and with enough to do to satisfy its full-time search and rescue and law enforcement missions, was once again being asked to take on another job. The Coast Guard accepted the challenge. Unlike in the past, however, the resources were available, but from a surprise source: enter the reservists of the Seventh District under the guidance of Commander, Coast Guard Reserve Group Jacksonville.

As a result of much planning and a great deal of trial and error, STS-1, **Columbia**, was launched on 12 April 1981 with a secure safety zone surrounding it. NASA was so pleased with the results that it offered the Coast Guard the permanent job of guarding the shuttle. Thus from about 96 hours prior to each launch until 4 hours after the spacecraft is in the air, the Coast Guard Reserve is on hand for shuttle security operations.

The logistics of the entire security operation are handled by Coast Guard Reservists. A reserve officer is the patrol commander, and a reserve officer on temporary active duty (TEMAC) is responsible for setting up the entire safety/security zone.

For the TEMAC officer, this involves renting or borrowing campers, trailers, camping equipment, etc., for security forces on land. (While the Coast Guard primarily maintains a water safety/security zone, it is also responsible for maintaining land sites which include a radar installation.) It also involves obtaining enough food, drink, and sleeping facilities for all of the personnel involved and setting up schedules for up to 50 reservists who are called to special active duty for training (SADT) for this operation.

The patrol commander, who, until recently, was Commander, Reserve Group Jacksonville, is responsible to both NASA and Commander, Coast Guard Group Mayport. He is a reservist and is given overall command of the security zone and its forces. He has the ultimate responsibility for the entire operation and is the one who would make the decision in a shoot-or-don't-shoot situation, should anyone attempt to penetrate the zone.

Not just anybody can participate in the operation. To be eligible, an individual must apply for the specific billets (jobs) that are required, and the applicant must have all of the pertinent qualifications for that billet. For instance, boat crews must not only be fully qualified and certified in accordance with the Coast Guard's new boat crew qualification program, but they must all be completely qualified to handle various small arms. Since the Coast Guard is maintaining a security zone in addition to a safety zone, it is important for individuals to be aware of how and when to use rifles, shotguns, and pistols.

This brings us to where augmentation and mobilization enter the picture. While mobilization exercises are fine for seeing what the reservists do or do not know, they do not compare to the realism of the safety/security zone that is set up at the Kennedy Space Center prior to a shuttle launch. Once set up and in place, the safety/security zone is the real thing (i.e., boat crews are in place and are tasked with keeping intruders out of certain areas.) If the situation arises, they are permitted to use force to keep out anyone or anything that attempts to penetrate this zone. While the situation has never arisen, they are under orders that if a saboteur should attempt to penetrate, use of deadly force would be authorized. (A boat crew in this situation would contact the patrol commander who would give the authorization to shoot.)

The fact that this zone is the real thing makes it all the more worthwhile for the reservists of the Seventh District. They carry real weapons with real ammunition.

Very few individuals, if any, participate out of their rating, and those who do must be fully qualified for the out-of-rating job. (Personnel working out of their rating would have to

Fulfilling a mission that helps NASA and provides hands-on training for the Coast Guard Reserve, this cutter will patrol the waters surrounding the space shuttle launch site for up to 96 hours prior to blastoff and for 4 hours afterward. Official U.S. Coast Guard photo.

be current in the appropriate qualification codes.)

The officers also get valuable training. Besides the project officer and the patrol commander, many junior officers participate. While standing watches, the officers are responsible for moving forces from point to point and for ensuring logistics support. Others may be seeing that everyone eats proper meals, has medical attention, has a place to sleep, and that proper liaison is maintained between the Coast Guard and NASA.

Up to one shuttle launch per month is planned for the future -- a tall order for both NASA and the reservists. NASA looks at the Coast Guard as an integral part of the shuttle team. But there has been a problem with manpower. Up to now, the program has required 75 to 80 reservists per launch, which has been cut down to 45 to 50. In addition, specific requirements have been established to spread the mission among the District's five reserve groups, relieving Reserve Group Jacksonville of the burden of providing most of the personnel.

Until recently, there had also been some problems in which the reservists and the regulars have not always meshed in attempting to do the job. Commander, Seventh Coast Guard District, has just turned the security zone job entirely over to the reserve forces. This has been a big boost for the reserve program and will have other implications as well, including resolving the problem of chain of command. While Station Port Canaveral remains the host command, thus providing a platform from which to run the program, the regulars are out of the shuttle security business. This change enables them to devote 100 percent of their time to normal day-to-day operations.

The Coast Guard Reserves are honored to have been chosen to participate in a program of such major importance as that of the space shuttle.

From the Editor

The Essential Ron Bohn

Mr. Ron Bohn, Hazardous Materials Coordinator for the National Cargo Bureau, Inc., has contributed much valuable material to the **Proceedings** in the past few years. His column, "Hazardous Materials," is regularly featured in **Brandon's Shipper & Forwarder** and frequently is reprinted in the **Proceedings.**

International Thomson Transport Press is now taking orders for **Hazardous Materials,** a 64-page compilation of Ron Bohn's articles from 1982 through 1984. Each article has been updated by the author to reflect regulatory changes through February 1985.

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"Oops" Department

LCDR Abiles, Deputy Group Commander, Coast Guard Group Sault Ste. Marie, called to inform me that Coast Guard Cutter MACKINAW (page 193 of the September 1985 issue) is homeported in Cheboygan, Michigan, not Sheboygan. Sheboygan happens to be the spelling for Sheboygan, Wisconsin. Well, this is what happens when your editor has never been west of Pittsburgh.

My thanks to LCDR Abiles for the geography lesson and clarification.

Learning in the Great Lakes "Lab"

William L. Richardson
Chief, Large Lakes Research Station
Grosse Ile, Michigan
U.S. Environmental Protection Agency

Environmental scientists take great pains in planning and executing their laboratory experiments. The Environmental Protection Agency (EPA) and other water pollution scientists meticulously design experimental chambers, called microcosms, to simulate the reactions, fate, and effect of chemicals in aquatic systems. They mimic nature as they carefully control temperature, light, and, finally, the addition of chemicals, observing which organisms thrive, which ones die, how fast they grow, what abnormalities occur, and how the chemicals are distributed between sediment, water, and animal and plant life. The information gained in this tiny world helps develop scientific understanding of chemical interaction with nature.

Nature, by contrast, provides the real world macrocosm; roughly 15,000 years ago she created her own experimental laboratory on the North American continent, and in doing so provided today's scientists a larger laboratory in which to study and predict the impact of chemical pollutants on our waters and the life within them, and on the food chain and water supply that ultimately sustain human life.

This experiment began with immense sheets of ice, miles thick, slowly carving enormous aquaria from the earth as they advanced southward. After centuries of grinding and gnawing, these glaciers retreated, leaving in their wake five magnificent shining emeralds, the Laurentian Great Lakes.

This vast "macro-laboratory" covers the five main lakes, the connecting channels and hundreds of feeder tributaries, embayments, and thousands of miles of shoreline. It provides the setting for man and nature's collaborative experiment in physics, biology, geology, chemistry, limnology, and toxicology, and also in political science, economics, sociology, and law. The experimental design includes man first as the perturber of the natural environment, then as one of the perturbed species, and, finally, as the scientist and manager.

Nature stocked the Great Lakes with thousands of organisms, from microscopic bacteria and plankton to lake trout and huge sturgeon. This ecosystem maintained its natural equilibrium for centuries, first supporting sparse human populations of native Americans and early European settlers. What human wastes entered the lakes over a century ago were rapidly purified by natural processes. But when the forests were harvested to supply wood to eastern and southern cities, the feeder streams and rivers were choked with pulp and sediments that destroyed important spawning areas. This was man's first serious interference (or "perturbation") with the region's ecosystems.

Few scientific observations were made until typhoid struck many Great Lakes town in the early 1900s. The typhoid-related studies resulted from the 1909 U.S.-Canada Boundary Waters Treaty and the establishment of the International Joint Commission (IJC), a binational body that negotiates international concerns about the Great Lakes and other common water systems.

These earliest studies, from 1913 to 1916, focus on the connecting channels — the Niagara River, Detroit River, St. Clair River, and Lake St. Clair — rather than the main lakes. The research centered on bacterial contamination from domestic sewage and found, for example, that the connecting channels flowing from Detroit into Lake Erie reversed their direction from time to time, bringing the raw

Photo by B.A. King

sewage back into the drinking water intakes. As a result of the research and its recommended solutions, drinking waters were treated and disinfected and the sewers relocated. Later, primary wastewater treatment was instituted.

Since the early 1900s, pollutants have flowed into the Great Lakes from growing industrial centers on or near their shores. Other pollutants have fallen from the atmosphere over the lakes' vast surfaces or come from pleasure boats and ore and grain ships carrying their cargoes from as far west as Duluth to the St. Lawrence Seaway. Nuclear power plants discharge cooling waters into the lakes. At one point in the 1960s, Lake Erie was declared dead or dying.

As all these elements were introduced into the Great Lakes "laboratory," the extent of American and Canadian research grew and became much more sophisticated. The first Conference on Great Lakes Research in July 1953, sponsored by the University of Michigan's Great Lakes Research Divison, led to organization of the International Association for Great Lakes Research, which today has over 1,000 members.

Larger research and monitoring programs followed in the wake of new and more serious environmental and public health concerns. When wildlife was destroyed in the 1950s by continuous oil slicks in the Detroit River, enraged duck hunters and early environmentalists carried the oil-soaked carcasses to the steps of state capitols and lobbied furiously in Washington. The general public was alarmed when beaches were closed to swimming, when dead fish lined the Chicago beaches, and when the Cuyahoga and Rouge Rivers actually caught fire.

With the survival of the Great Lakes ecosystem clearly at stake, the public demanded action. Under Public Law 660, anti-pollution enforcement and comprehensive studies were initiated. Scientific data were collected and used as evidence in federal/state enforcement actions. The Great Lakes Illinois River Basin Project (GLIRBP) provided the first comprehensive water quality information for the lakes, and it was used in a landmark decision on diversions through the Chicago Ship Canal.

At first, there was little need for sophisticated science in dealing with problems of gross pollution, i.e., grease, raw sewage, bacteria, dissolved solids, and the like. Judges and enforcement panels were usually convinced by the photographic evidence and data summaries showing blatant violations of water quality norms. But as we became more aware of the many chemicals involved and their potential impact not only on the ecology but also on human health, the 1970s saw the growth of research and surveillance efforts. Coordinated binational, interagency programs collected data and developed mathematical models to help predict the future consequences of man's impact on the lakes and provide insights into optimal control strategies.

As oil slicks were diminished by better waste treatment and controls, new studies revealed a more ominous problem that had been overshadowed by previous, more obvious concerns. Eutrophication (the process through which dissolved nutrients enrich the environment) had accelerated proliferation of plant life in the lakes. The bottom waters of Lake Erie were void of oxygen for much of the summer. Shoreline residents complained of massive weed mats and floating green scum. Water treatment plant operators complained of clogged intake filters, and citizens objected to the musty taste and odors of drinking water.

Researchers using deepwater vessels were able to get water, sediment, and plant and other samples from all parts of Lake Erie. They found that the combination of waste contaminants pouring into its waters was stimulating plant growth to the point where decaying vegetation was depleting the oxygen needed by fish and other helpful organisms. They were also able to relate the problem to the seasons of the year.

The end result? Mathematical predictions that correctly forecasted quality improvements that could be achieved if the input of phosphorus was reduced. This research led to a billion-dollar cleanup program and vast improvements in Lake Erie.

The research also led to initiation of new studies of toxic substances. As a result, DDT was banned when researchers confirmed its impact on Lake Michigan wildlife feeding on Great Lakes fish (fish are amazing collectors of pollutants in the waters in which they live). In 1969, mercury was found in fish in Lake St. Clair and the Detroit River. It was discovered that mink reproduction fell off as a result of PCB-contaminated salmon used as food.

Asbestos became the issue in Lake Superior when scientists found it to be a dangerous component in the taconite tailings dumped into the lake by the Reserve Mining Company plant. Those findings contributed to a major court decision. And, most recently, toxaphene, a pesticide used primarily in the southern United States, was banned after it was found in fish in a lake on Isle Royale in the middle of Lake Superior.

Today, over 800 chemicals have been identified by research scientists studying Great Lakes fish samples. Health advisories remain in effect in many parts of the lakes.

As minute as some of the loadings of chemicals are, biomagnification may concentrate them up to a millionfold at the top of the food chain. It is not yet clear what real impact or risks many of these chemicals may present, either alone or in combination. There is some evidence that toxic substances may be preventing lake trout reproduction in Lake Michigan and may be retarding other ecosystem functions. The presence of tumorous fish and deformed fish larvae may also indicate contaminant effects.

Because it is impossible to study simultaneously all the chemicals in every lake, researchers have chosen to study thoroughly a few chemicals at selected locations. Now under study are radionuclides, PCBs, heavy metals, and aromatic hydrocarbons in the Great Lakes region.

Chemical pollution and other concerns in the Great Lakes coincided with increased national awareness of environmental degradation, the establishment of EPA in 1970, the signing of the U.S.-Canadian Great Lakes Water Quality Agreement in 1972, and passage of the Federal Water Pollution Control Act. In 1971, EPA established its Great Lakes research program at Grosse Ile, Michigan, and in 1978 created the Great Lakes National Program Office in Chicago.

Most recently, a coordinated study has been investigating the Upper Great Lakes connecting channels. This study is continuing nature's experiment, as scientists working in microlabs and the Great Lakes macrolab carry on man's urgent efforts to keep his fresh waters clean and the food chain safe. ⚓

*Reprinted from the **EPA Journal**, Vol. 11, No. 2, March 1985.*

1984 Merchant Marine Personnel Statistics

Merchant Marine Officer Licenses Issued
Deck

	Issues	Endorsements	Failures	Renewals
Master, Any Gross Tons, Oceans	133	23	45	649
Master, Lakes,Bays,Sounds/Rivers	39	19	11	168
Master, Great Lakes	7	6	10	55
Master, Coastwise	18	1	0	24
Master, Uninspected Vessels	80	42	29	147
Master, Fishing Vessels	14	1	18	49
Master, Ferry Vessels or MODUs*	56	4	13	33
Master, Freight and Towing Vessels	403	135	136	150
Master, Mineral and Oil Vessels	395	148	158	234
Chief Mate, Any Gross Tons, Oceans	134	36	89	144
Chief Mate, Limited Tonnage	33	12	3	2
Second Mate, Any Gross Tons, Ocean	209	22	117	158
Third Mate, Any Gross Tons, Ocean	323	14	131	264
Mate, Uninspected Vessels	44	13	25	27
Mate, Fishing Vessels	3	4	1	4
Mate, Ferry Vessels or MODUs	13	0	13	3
Mate, Freight and Towing Vessels	140	26	68	24
Mate, Mineral and Oil Vessels	168	20	64	22
First Class Pilot	109	489	85	892
Second Class Pilot	1	0	0	1
Operator, Uninspected Towing Vessels	595	144	545	2,296
Second Class Operator, Uninspected Towing Vessels	130	16	195	20

*MODU - Mobile Offshore Drilling Unit

Engineer

	Issues	Endorsements	Failures	Renewals
Chief Engineer, Motor	87	79	53	152
First Assistant, Motor	51	62	23	64
Second Assistant, Motor	106	72	50	60
Third Assistant, Motor	201	18	25	385
Chief Engineer, Steam	93	1	77	475
First Assistant, Steam	125	6	54	210
Second Assistant, Steam	111	15	72	272
Third Assistant, Steam	118	4	17	173
Chief Engineer, Steam & Motor	18	8	5	166
First Assistant, Steam & Motor	11	7	0	27
Second Assistant, Steam & Motor	37	8	11	36
Third Assistant, Steam & Motor	375	2	7	351
Chief Engineer, Uninspected Vessels	132	43	45	136
Assist. Engineer, Uninspected Vessels	77	9	43	28
Chief Engineer, Fishing Vessels	0	1	2	35
Assistant Engineer, Fishing Vessels	0	0	1	4
Chief Engineer, Ferry Vessels or MODUs	20	9	13	24
Assistant Engineer, Ferry Vessels or MODUs	3	2	2	0
Chief Engineer, Mineral & Oil Vessels	135	46	18	59
Assistant Engineer, Mineral & Oil Vessels	21	3	1	1

Staff Officer Certificates of Registry Issued

Surgeon	10
Professional Nurse	1
Chief Purser	7
Chief Purser/PYA*	0
Chief Purser/HM**	0
Purser	8
Purser/PYA	10
Purser/HM	1
Senior Assistant Purser	4
Senior Assistant Purser/PYA	0
Senior Assistant Purser/HM	1
Junior Assistant Purser	25
Junior Assistant Purser/PYA	0
Junior Assistant Purser/HM	2

* PYA - Physician Assistant

** HM - Hospital Corpsman

Operator Licenses

	Issues	Endorsements	Failures	Renewals
Small Passenger Vessels (Ocean)	3,429	623	1,775	2,084
Small Passenger Vessels (Inland)	1,134	146	899	751
Uninspected Passenger Vessels	2,630	116	1,924	1,437

Radio Officer License

	Issues	Endorsements	Failures	Renewals
Radio Officer	10	3	N/A	242

Summary of All License Transactions

	Issues	Endorsements	Failures	Renewals
Deck (Less OUTV & 2/c OUTV*)	2,551	1,132	1,113	3,422
OUTV & 2/c OUTV	725	160	740	2,316
Engineer	1,804	412	540	2,726
Staff Officer	53	N/A	N/A	N/A
Operator (SPV & UPV**)	7,193	885	4,588	4,272
Radio Officer	10	N/A	N/A	242
Radar Observer	N/A	3,064	N/A	N/A
Totals	12,336	5,653	6,981	12,978

Total All Transactions 37,948

*OUTV & 2/c OUTV - Operator, Uninspected Towing Vessels and Second Class Operator, Uninspected Towing Vessels

**SPV & UPV - Small Passenger Vessels and Uninspected Passenger Vessels

Comparison

	1982	1983	1984
Licenses Issued/Renewed	24,499	32,337	25,314
Endorsements	2,826	2,767	2,589
Failures	5,819	9,980	6,981
Radar Observer	1,510	3,552	3,064
Total Transactions	34,654	48,636	37,948

Original Merchant Mariners Document Issued

YEARLY	ATLANTIC COAST	PACIFIC COAST	GULF COAST	GREAT LAKES REGION	TOTAL
January 1984	61	225	532	3	821
February 1984	42	215	275	3	535
March 1984	52	173	294	10	529
April 1984	71	206	265	15	557
May 1984	76	152	282	9	519
June 1984	43	200	271	5	519
July 1984	60	129	320	15	524
August 1984	303	186	285	15	789
September 1984	36	223	237	7	503
October 1984	53	176	275	11	515
November 1984	49	154	256	11	470
December 1984	137	135	221	4	497
TOTAL	983	2,174	3,513	108	6,778

Original and Additional Endorsements Issued

	ATLANTIC COAST	PACIFIC COAST	GULF COAST	GREAT LAKES REGION	TOTAL
AB-Any Waters, Unlimited	605	239	536	14	1,394
AB-Any Waters, 12 Months	36	82	81	3	202
AB-Great Lakes, 18 Months	28	47	70	1	146
AB-Other	253	134	576	14	977
Lifeboatman	1,124	252	177	7	1,560
Electrician	82	73	29	1	185
Oiler	136	156	87	8	387
Fireman/Watertender	105	113	52	7	277
Other Q.M.E.D. Ratings	1,490	389	168	30	2,077
Tankerman	192	148	543	22	905
Entry Ratings and Steward's Department including Temporary Documents	4,606	5,912	2,892	155	13,565
TOTAL	8,657	7,545	5,211	262	21,675

Marine Safety Council Membership

Rear Admiral Clyde T. Lusk, Jr.

Rear Admiral Clyde Thomas Lusk, Jr. assumed command of the Eighth Coast Guard District on 28 June 1985. He formerly served as Chief of the Office of Merchant Marine Safety at Coast Guard Headquarters and was a member of the Marine Safety Council.

Rear Admiral Lusk was born on December 20, 1932 at Medford, Massachusetts and graduated from Milford High School in Milford, New Hampshire. He entered the U.S. Coast Guard Academy, New London, Connecticut, and graduated in 1954 with a B.S. degree and a commission as Ensign.

His earliest assignments were First Lieutenant on the USCGC DUANE (1954-56) and Operations Officer on the USCGC EVERGREEN (1956-57).

His first shore assignment was Commanding Officer of LORAN Station Spruce Cape at Kodiak, Alaska. In 1959 he was transferred to the Marine Inspection Office at Long Beach, California. He was then transferred to Headquarters and served on staff in the Office of Merchant Marine Safety.

In 1965 he was assigned to marine industry training with the American Waterways Operators, Inc. Upon completion of training, he was transferred to the Marine Safety Office in St. Louis where he served as Executive Officer and Commanding Officer. His next transfer was a return to Washington where he sequentially served on the Planning Staff of the Office of Merchant Marine Safety, as Assistant Chief of the Merchant Vessel Inspection Division, and on the Secretary of Transportation's Staff as Director of Transportation Energy Policy. During 1974-75, he attended the Industrial College of the Armed Forces. Upon completion of his studies, he was transferred to New Orleans, Louisiana where he first served as Commanding Officer of the Marine Inspection Office and then as Chief of Operations of the Eighth Coast Guard District. He returned to Headquarters in 1980 to serve as Deputy Chief, Office of Merchant Marine Safety.

On 1 July 1981, he was appointed by the President to the rank of Rear Admiral and assumed the duties as Chief, Office of Merchant Marine Safety at Headquarters, a position he held until his assignment as Commander, Eighth Coast Guard District, New Orleans.

Rear Admiral Lusk's many decorations include the Coast Guard Meritorious Service Medal (2), Secretary's Award for Service — Silver Medal, Coast Guard Commendation Medal, Coast Guard Achievemnt Medal, Commandant Letter of Commendation, Coast Guard Unit Commendation Medal, Expert Rifle and Pistol, and the National Defense Medal.

Rear Admiral Lusk is married to the former Beverly J. Tasko of Wethersfield, Connecticut, a graduate of Connecticut College for Women. They have six children: Joan Elaine, Gaile Marie, Lois Elizabeth, Mark Thomas, Lori Ann, and John Edward.

Commodore Peter J. Rots

Commodore Peter J. Rots became Chief, Office of Marine Environment and Systems, effective 8 July 1985.

Commodore Rots was born in Pittsburgh, Pennsylvania. He received his secondary education at Dormont High School. He is a 1957 graduate of the Coast Guard Academy, New London, Connecticut, with a B.S. degree in engineering and holds a master's degree in industrial administration from the Krannert School of Business, Purdue University. Commodore Rots earned his wings at Corpus Christi, Texas, in 1960. He is a 1979 graduate of the Industrial College of the Armed Forces.

During his more than 28 years in the Coast Guard, Commodore Rots has had a variety of operational, engineering, and administrative assignments. From 1965 through 1969, he was the Coast Guard's Program Manager for the HU-16E Albatross aircraft and the HH-52A helicopter which still sees service today. Following a tour at the Aircraft Repair and Supply Center, Elizabeth City, North Carolina, from 1970 to 1975, where he was Chief of the Aviation Technical Training Division and later Executive Officer, he was assigned as Commanding Officer, Coast Guard Air Station Detroit, Michigan. His responsibilities included search and rescue coverage for the maritime regions of Lake Huron, Lake St. Clair and Lake Erie. Upon graduation from the Industrial College in 1979, Commodore Rots was selected to head a study group to establish an Office of Navigation at Coast Guard Headquarters. This new office commenced operations in March 1980, and he was assigned as the first Deputy Office Chief. Prior to his current assignment, Commodore Rots was the Chief of Staff, Fifth District, Portsmouth, Virginia. On 1 July 1985, he was promoted to the flag rank of Commodore and was designated Chief of the Office of Marine Environment and Systems at Coast Guard Headquarters.

Included in his decorations are four Meritorious Service Medals with Operational Distinguishing Device, the Coast Guard Commendation Medal, and the Achievement Medal. During his tour in Alaska, he was awarded the Air Medal for a rescue of 34 stranded miners from an avalanched mine in British Columbia.

Commodore Rots is married to the former Judith Johnson from Pittsburgh, Pennsylvania. They currently reside in Annandale, Virginia. They have two children, David, a lieutenant in the U.S. Army (aviation), and Susan, employed by the city of Cleveland in a program of providing horseback riding therapy for the handicapped.

Commodore J. William Kime

Commodore J. William Kime became Chief, Office of Merchant Marine Safety, on 8 July 1985.

Commodore Kime was born in Greensboro, North Carolina on 15 July 1934 and grew up in Baltimore, Maryland, having graduated from City College in 1951. He graduated from the Coast Guard Academy in 1957 and served in deck and engineering billets aboard the CGC CASCO before assuming command of LORAN Station Wake Island in April 1960. He attended the Massachusetts Institute of Technology in Cambridge from 1961-64, receiving an M.S. degree in naval architecture and marine engineering and the Professional Degree of Naval Engineer.

Commodore Kime served a number of tours at Coast Guard Headquarters in both the Merchant Marine Technical and Naval Engineering Divisions and afloat again in Boston as the First Engineering Officer aboard CGC BOUTWELL. While at Coast Guard Headquarters, he served as the principal U.S. Negotiator at the International Maritime Organization (IMO) in London during the drafting of the IMO Code for Liquefied Gas Ships and was in charge of the structural design of the Polar Star Class Coast Guard Icebreakers. After completing his studies at the Industrial College of the Armed Forces in 1977 as a distinguished graduate, Commodore Kime was again assigned to Coast Guard Headquarters to serve as Assistant Chief of the Merchant Marine Technical Division, Head of the U.S. Delegation at two sessions of the Design and Equipment Subcommittee at IMO, and both general coordinator and member of the U.S. Delegation to the International Conference on Tanker Safety and Pollution Prevention in London in 1978.

Commodore Kime assumed the duty of Commanding Officer, Marine Safety Office Baltimore in July 1978. In June 1981, he was assigned again to Coast Guard Headquarters as Deputy Chief of the Office of Marine Environment and Systems. Commodore Kime assumed the post as Chief, Operations Division of the Seventh Coast Guard District in June 1982 where his duties involved the day-to-day direction of the Coast Guard drug and illegal migrant interdiction efforts in the Caribbean. On 1 August 1984 he was promoted to the rank of Commodore and was designated Chief of the Office of Marine Environment and Systems at Coast Guard Headquarters.

Commodore Kime is a Registered Professional Engineer, a member of Tau Beta Pi, Sigma Xi, the American Society of Mechanical Engineers, the American Society of Naval Engineers, Inc., and the Society of Naval Architects and Marine Engineers. His decorations include the Defense Superior Service Medal; five Meritorious Service Medals, with Operational Distinguishing Device; the Commendation Medal; the Achievement Medal; three Commandant Letter of Commendation Ribbons, with Operational Distinguishing Device; two Unit Citations, with Operational Distinguishing Device; and the Meritorious Unit Citation. Commodore Kime is married to the former Valerie Jean Hiddlestone of Pontardulais, South Wales.

Keynotes

Final Rules

CGD 82-002	Actions Against Seamen's Licenses, Certificates, or Documents	9 August

This rule will revise the regulations pertaining to suspension and revocation proceedings against a seaman's license, certificate, and/or document. This action will bring the existing regulations up to date with statutory and case law changes which have occurred since the last revision and will provide for a better understanding of the procedures on the part of the affected public.

CGD 79-158	Deepwater Port Liability Fund	15 August

The Coast Guard is finalizing the interim final Deepwater Port Liability Fund Regulations published in the Federal Register on June 24, 1982. The regulations implement provisions of the Deepwater Port Act of 1974.

CGD 83-047	Compatibility of Cargoes	16 August

This final rule updates 46 CFR Part 150 by adding recently authorized exceptions to the Compatibility Chart and cargoes approved for carriage since the final rule was published on April 14, 1983 (48 FR 16059).

Interim Final Rule

CGD 78-174	Hybrid PFDs, Establishment of Approval Requirements	22 August

This interim final rule establishes approval requirements for hybrid inflatable personal flotation devices (PFDs).

Approval Notice

CGD 85-012	Equipment, Construction, and Materials Approval List	1 August

This notice contains a listing of Coast Guard approvals issued between 1 February 1985 and 31 May 1985. These approvals are for safety equipment and materials required by regulation to be used on certain merchant vessels and recreational boats, and also in Outer Continental Shelf activities.

Requests for copies of NPRMs should be directed to the Marine Safety Council. The address is Commandant (G-CMC), U.S. Coast Guard, 2100 Second Street, SW, Washington, DC 20593; telephone (202) 426-1477. The office, Room 2110, is open between the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday. Comments are available for inspection or copying during those hours.

Creosote

Creosote is the product of tar distillation from beech and other woods. It is a tarry-smelling, oily liquid which ranges from very pale yellow to dark brown in appearance. Creosote is only slightly soluble in water and is basically non-reactive.

Uses for creosote are many and include applications as an antiseptic, disinfectant, germicide, fungicide, animal dip, die-mold lubricant, and waterproofing agent. However, creosote is most commonly known as a wood preservative. Railroad ties, telephone poles, fence posts, marine pilings, and lumber for outdoor use will last for years if properly treated with the chemical.

One of the most interesting and curious uses for creosote is that of a vermicide for sheep. A 5cc dose of a 5-percent solution injected into a sheep's windpipe over the course of 2 to 3 weeks can rid the animal of lung worms. A 20cc dose of a 1-percent solution is effective as a drench for stomach worms.

Even though a weak creosote solution can benefit animals, humans must approach the chemical with care. It is absorbed rapidly through the skin and intestinal tract, but inhalation is the most common danger. Symptoms of inhaling the toxic fumes are visual impairment and difficulty with thought and speech processes. Prolonged exposure may result in vomiting, excessive salivation, respiratory difficulties, weak pulse, vertigo, headache, loss of reflexes in the pupil of the eye, hypothermia, cyanosis and mild convulsions.

Treatment for creosote exposure varies and is dependent upon the actual type of exposure:

Inhalation. Remove the victim to fresh air and administer mouth-to-mouth resuscitation if breathing has ceased. If the victim is breathing but is doing so with difficulty, administer oxygen.

Eye contact. Immediately flush the eyes with water for at least 15 minutes.

Skin contact. Wipe the exposed area with vegetable oil or margarine, then wash with soap and water.

Swallowing. Have the victim drink water or milk, but do not induce vomiting.

In any type of creosote exposure, it is important to call a physician for further instructions or treatment.

Creosote has a high carcinogenic potency and has been known to cause skin cancer. To limit the danger from creosote exposure, the Environmental Protection Agency suggests that creosote-treated wood be coated with a recommended sealer, such as urethane, epoxy or shellac.

Personnel working with creosote should have and use a self-contained breathing apparatus, overalls or a neoprene apron, and barrier creams. Contaminated clothing should be removed and cleaned before being used again. If these simple precautions are taken, creosote poses no danger.

Creosote is a moderate fire hazard when exposed to heat or flames, although a flammable vapor may spread in the event of a spill. Small fires should be extinguished with water spray, CO_2, dry chemicals, or alcohol foam. Larger fires may be extinguished with water spray or fog or an alcohol foam.

Creosote is compatible with iron or steel containers and is often shipped in drums or tank cars. The Code of Federal Regulations does not require the chemical to be marked with special labels.

In the event of a spill or leak, call the National Response Center at 1-800-424-8802. Stop the leak, if it is possible to do so without risk, and ensure that all personnel are protected from exposure. Dike ahead of the spill for later disposal and cleanup. No flares, smoking or flames should be allowed in the area. A water spray may be used to reduce the vapors.

Noncombustible, absorbent materials may be used to soak up a small creosote spill. The area should then be flushed with plenty of water.

Byron Black was a Third-Class Cadet at the Coast Guard Academy when this article was written. It was written under the direction of LCDR Thomas J. Haas for a class on hazardous materials transportation.

The U.S. Coast Guard regulates creosote as a Grade E combustible liquid. The regulations governing it can be found in the Code of Federal Regulations, Title 46, Subchapter D, parts 30 to 40. The International Maritime Organization includes creosote in Chapter 7 of its Chemical Code, which lists chemicals to which the code does not apply. Creosote is not regulated by the U.S. Department of Transportation, nor is it included in the International Maritime Dangerous Goods (IMDG) Code. ‡

Chemical name:	Creosote
Formula:	none
Synonyms:	creosote oil liquid pitch oil tar oil coal tar brick oil creosotum dead oil heavy oil wash oil
Physical Properties:	
boiling point:	greater than 180°C (greater than 356°F)
Threshold Limit Values (TLV)	unavailable
Flammability Limits in Air	unavailable
Combustion Properties	
flash point:	75°C (165°F)
autoignition temperature:	335°C (637°F)
Densities	
liquid (water=1):	greater than 1
vapor (air=1):	not applicable
U.N. Number:	unassigned
CHRIS Code:	CCT (coal tar) CWD (wood) CCW (creosote)
Cargo compatibility group:	21 (Phenols, Cresols)

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations:

ENGINEER

1. When capacitors are used in electric distribution systems to improve power factor, this is accomplished by seesawing energy between the capacitor and the

A. generator.
B. inductive loads.
C. resistive loads.
D. all of the above.

Reference: Hubert, Preventive Maintenance of Electrical Equipment

2. If the air inlet manifold pressure of a diesel engine is increased, the

A. maximum cylinder pressure will decrease.
B. ignition lag will increase.
C. rate of pressure rise in the cylinder during combustion will decrease.
D. exhaust manifold pressure will decrease.

Reference: Maleev, Diesel Engine Operation and Maintenance; Stinson, Diesel Engineering Handbook

3. What can cause the flame of a mechanical atomization burner to be blown away from the burner tip when you are attempting to light off?

A. Insufficient excess air being supplied to the furnace.
B. Fuel oil pressure is too high.
C. The diffuser is burned out.
D. The secondary air cone is improperly adjusted.

Reference: Osbourne, Modern Marine Engineer's Handbook, Vol. 1

4. A centrifugal pump with a double volute casing which is operated at greater than design capacity will

A. be less susceptible to shaft deflection than a similar pump with a single volute casing operated.
B. be more susceptible to shaft deflection than a similar pump with a single volute casing operated.
C. develop excessive radial thrust and resultant shaft deflection.
D. none of the above.

Reference: DeLavel, Engineering Handbook; Karassik, Krutzch, Fraser, and Messina, Pump Handbook

5. Oil separators installed in refrigeration systems serve to

A. remove excess oil from the system.
B. remove oil entrained in high pressure liquid lines.
C. return oil entrained in refrigerant vapor back to the compressor crankcase.
D. all of the above.

Reference: Dossat, Principles of Refrigeration

DECK

1. Petroleum cargo tanks should not be topped off at deck level, when loading on a cold day, because

A. the tank valve may be stiff and a spill will occur before the valve can be closed.
B. air pockets may cause the cargo to bubble out the ullage hole.
C. the increased viscosity requires higher loading pressure which increases the chance of a spill.
D. a subsequent temperature rise will cause the cargo to overflow.

Reference: Merchant Marine Officer's Handbook

2. Which of the following statements is correct concerning a gnomonic projection?

A. a rhumb line appears as a straight line.
B. Distance is measured at the mid-latitude of a particular course to be used.
C. Meridians appear as curved lines converging toward the nearer pole.
D. Small circles appear as curved lines.

Reference: Dutton's Navigation and Piloting

3. The standing part of a tackle is

A. all the falls except the hauling part.
B. that part of the falls made fast to one of the blocks.
C. that part to which power is applied.
D. the hook that engages the weight to be moved.

Reference: American Merchant Seaman's Manual

4. Which of the following is the correct definition of "height of tide?"

A. The vertical distance from the tidal datum to the level of the water at any time.
B. The vertical difference between the heights of low and high water.
C. The vertical difference between a datum plane and the ocean bottom.
D. The vertical distance from the surface of the water to the ocean floor.

Reference: Dutton's Navigation and Piloting

5. Which of the following is normally used to hold wire rope for splicing?

A. Jigger
B. Sealing clamp
C. Come along
D. Rigger's vise

Reference: Knight's Modern Seamanship

ANSWERS

ENGINEERING
1-B;2-C;3-C;4-A;5-C
DECK
1-D;2-D;3-B;4-A;5-D

If you have any questions about "Nautical Queries," please contact Commanding Officer, U.S. Coast Guard Institute (mvp), P.O. Substation 18, Oklahoma City, Oklahoma 73169; telephone (405) 686-4417. ‡