January 30, 2025 MIR-25-06

Container Loss aboard Containership *President Eisenhower*

On February 6, 2024, about 2135 local time, the US-flagged containership *President Eisenhower* was drifting about 94 miles south of Oakland, California, while awaiting a berthing assignment, when the crew discovered that 23 shipping containers had been lost overboard (see figure 1 and figure 2).[1] None of the lost containers carried hazardous materials. There were no injuries, and no pollution was reported. Damage to the containership and the value of the lost cargo was estimated to exceed $735,000.[2]

Figure 1. *President Eisenhower* underway at unknown date before the container loss. (Source: Bar Pilot, marinetraffic.com)

[1] In this report, all times are Pacific standard time, and all miles are nautical miles (1.15 statute miles).

[2] Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA24FM023). Use the CAROL Query to search investigations.

Casualty Summary

Casualty type	Ship/Equipment/Cargo Damage
Location	Pacific Ocean, 94 miles south of Oakland, California 36°17.10′ N, 122°58.80′ W
Date	February 6, 2024
Time	2135 Pacific standard time (coordinated universal time –8 hrs)
Persons on board	23
Injuries	None
Property damage	$735,000 est.
Environmental damage	None reported
Weather	Visibility 10+ nm, partly cloudy, winds northwest 20 kts, seas 8 ft, swells northwest 11–12 ft, air temperature 50°F
Waterway information	Ocean; depth 3,185 ft

Figure 2. Area where the *President Eisenhower* container loss occurred, as indicated by a circled *X*. (Background source: Google Maps)

1 Factual Information

1.1 Background

The US-flagged, 984-foot-long cargo vessel (containership) *President Eisenhower* was built in 2005 by Hyundai Heavy Industries in Ulsan, South Korea. Originally named the *Hanjin Dallas*, the vessel had a maximum container capacity of 7,471 twenty-foot equivalent units.[3] The vessel was owned by President Eisenhower Trust and operated by APL Maritime Ltd. The *President Eisenhower* routinely transported cargo (containers) between southeast Asia and the US west coast.

1.2 Event Sequence

On January 31, 2024, at 0520, the *President Eisenhower* arrived at the Fenix Marine Services terminal in the Port of Los Angeles in Los Angeles, California, with a crew of 23 on board. At 0715, a team of longshoreman boarded the vessel to begin loading operations. Over the next 2 days, longshoremen loaded containers in 16 of the containership's 18 bays (see section 1.3.2 for more details). Lashing rods and turnbuckles were used to secure the containers in the lower tiers to a lashing bridge and to deck-mounted lashing plates. Containers in the upper tiers were secured to other containers above and below using twist locks (see figure 3).[4]

[3] *Twenty-foot equivalent units* (TEU) measure the carrying capacity of a containership based on the number of 20-foot-long containers the vessel is capable of loading (standard shipping container lengths are 20 and 40 feet).

[4] *Twist locks* are container-securing devices that are attached to the corner castings of each shipping container to secure the containers to either raised sockets on the deck or to other containers within a container stack. *Lashings*, or *lashing rods*, are used in conjunction with turnbuckles to secure containers in the lower tiers of a container stack to deck-mounted lashing plates or a lashing bridge.

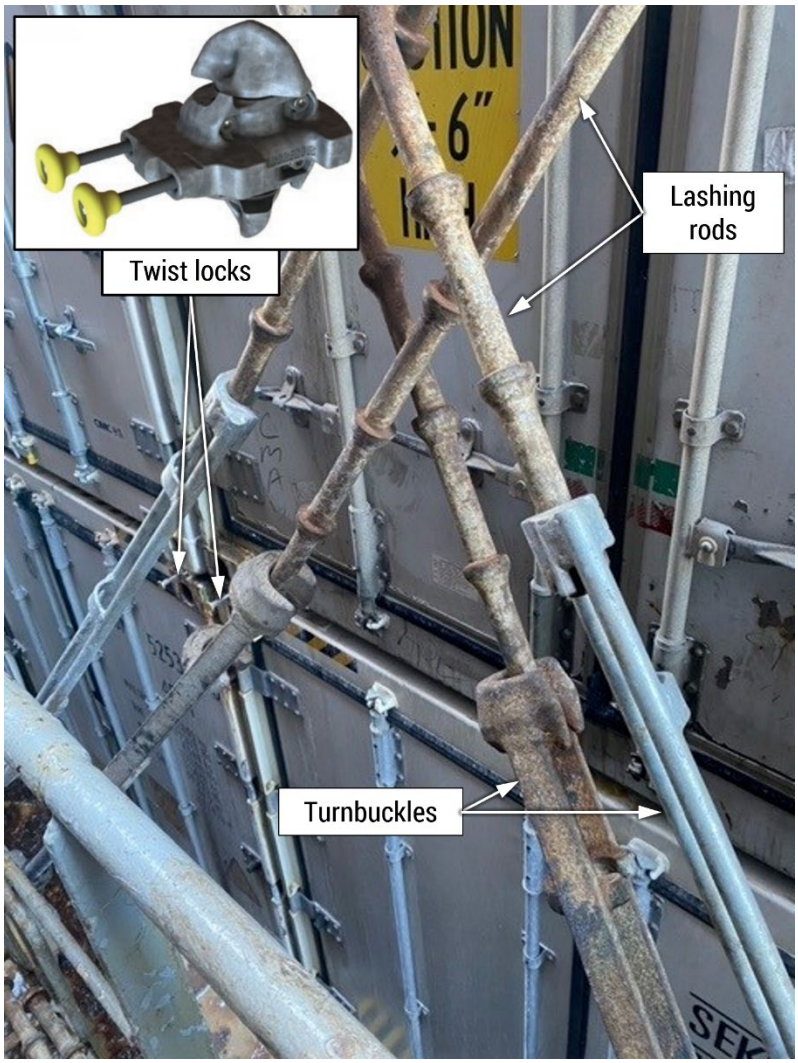

Figure 3. Intact lashings (lashing rods and turnbuckles) and twist locks on *President Eisenhower* after the casualty. Inset shows an exemplar twist lock. (Background sources: US Coast Guard, MacGregor)

On February 2, at 2100, loading was completed in bay 42, and the *President Eisenhower* second mate completed a round to inspect the container twist locks and lashings. Throughout the loading process, the crew monitored the draft and stability of the *President Eisenhower*, with no issues reported.

The following day, on February 3, at 0416, cargo operations were completed. To prepare for departure, the chief mate recorded the vessel's draft as 9.50 meters (31.17 feet) forward and 10.00 meters (32.80 feet) aft. These draft measurements were compared with the calculated drafts from the onboard cargo loading and stability software, which used the container stack weights on the cargo loading plan to estimate the expected draft based on the loading conditions. The calculated drafts from the loading software were 9.37 meters (30.74 feet) forward, 9.44 meters

(30.98 feet) midships, and 10.05 meters (32.97 feet) aft with a calculated displacement of 72,351 metric tons.[5]

At 0525, the *President Eisenhower* got underway from the Port of Los Angeles en route to Oakland, California, planning to arrive on February 7 due to berth availability. Once underway, the chief mate completed a deck round, which included inspections of the container lashings. These rounds were completed daily from February 2 to 5, with no issues noted, as the vessel transited the Pacific Ocean. During this time, the largest vessel roll the crew observed was 5° on February 4.

On February 6, about 0837, the *President Eisenhower* was about 75 miles from the Port of Oakland. Due to port congestion, the containership began drifting (the ship's main propulsion engine was stopped but remained in standby) off the coast while awaiting a berthing assignment. About this time, winds were north at 9 knots with about 2-foot seas and 10-foot northwest swells, and the vessel was rolling at a maximum of 5°. At 1000, the chief mate completed a daily deck round of the containers, noting no issues.

As the vessel drifted throughout the day, the wind and sea conditions increased. At 2000, the crew reported 20-knot northwest winds, 8-foot seas with 11- to 12-foot northwest swells, and that the vessel was rolling at a maximum of 18°.

At 2135, the vessel was about 94 miles from the Port of Oakland when the able seaman (AB) noticed what looked like smoke on the port side of the vessel. The third mate sent the AB to investigate. The AB discovered that the "smoke" was powder in the air from collapsed containers and saw that containers were missing from the port side of bay 42. The AB notified the bridge, and then the third mate notified the captain and chief mate.

At 2206, the vessel began making way to minimize the rolling motion. The chief mate and reeferman assessed the damage and consulted the cargo loading plan to confirm that none of the lost containers held hazardous material.[6] At 2250, the crew notified the US Coast Guard of the container loss. The *President Eisenhower* arrived in the Port of Oakland at 1930 on February 7.

[5] Company policy allowed for a "correction factor," or acceptable deviation, of 0.2 meters (0.7 feet) between the cargo loading software calculated drafts and the visual drafts to account for variations in container weights, ballast, and dead load.

[6] A *reeferman*, or *refrigeration technician*, is responsible for maintaining and operating the refrigeration units on board, including refrigerated shipping containers, and ensuring the proper temperature control of perishable cargo.

1.3 Additional Information

1.3.1 Damage

Twenty-three containers fell overboard, and an additional 10 containers were damaged—all from bay 42 (see figure 4 and figure 5). None of the containers that fell overboard were recovered. The total value of the lost cargo was estimated to exceed $630,000. A postcasualty survey by the classification society documented damage to the *President Eisenhower*'s container lashing sockets (used to secure the lashings for the lowermost containers to the deck), guardrails, portside hatch cover, and a light post. Total cost to repair the damage was $105,459.

Figure 4. *Left to right*: Area of the container collapse in bay 42 on the port side of the *President Eisenhower* and closer view of collapsed containers in bay 42. (Source: Coast Guard)

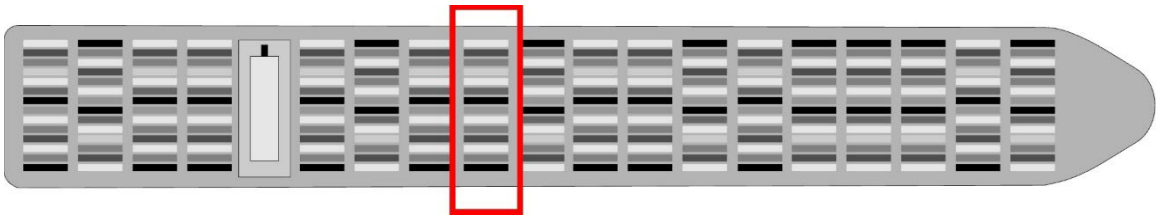

Figure 5. Simplified overhead view of the *President Eisenhower* with a rectangle indicating the approximate location of bay 42.

1.3.2 Cargo Loading

1.3.2.1 Cargo Loading Plan

On February 1, longshoremen loaded 102 containers in bay 42, four bays forward of the deckhouse, above the main deck. In bay 42, containers not loaded inside of the vessel's cargo holds were loaded in a fore and aft orientation in six-high stacks on top of the hatch covers in the bay. There were 17 container stacks arranged across the vessel from port to starboard.

When loading the containers, the longshoreman used a cargo loading plan created by a ship planner team using a stowage planning software.[7] The cargo loading plan was made by the ship planner using the verified gross mass (VGM) of each container as reported by the booking agent.[8] When booking a shipping reservation, each shipper entered the cargo weight and VGM of their container(s) into an online booking system. The booking agent then provided the container VGM to the ship planner to create the cargo loading plan and determine required lashing arrangements. The cargo loading plan for the *President Eisenhower* was provided to the terminal on January 30. The VGM of each container was not verified at the terminal, nor did the terminal cranes have the capability to weigh the containers.

The cargo loading plan was developed in accordance with the operating company's cargo securing manual (CSM), which was part of their safety management

[7] The shoreside team responsible for cargo planning was the ship planner; the bookings were handled by a booking agent. Both were part of the parent company of the vessel operator.

[8] The *International Safety for Life at Sea Convention* (*SOLAS*) chapter VI, part A, regulation 2 is implemented by the International Maritime Organization (IMO) Circular 1475, which defines gross mass as, "the combined mass of a container's tare mass and the masses of all packages and cargo items, including pallets, dunnage and other packing material and securing materials packed into the container," and requires that a "verified gross mass" be provided by the shipper "to the ship's master or his representative and to the terminal representative sufficiently in advance of ship loading to be used in the preparation and implementation of the ship stowage plan."

system (SMS). The operating company's CSM defined the maximum allowable weight for each container stack in bay 42 based on the container dimensions.[9] The CSM outlined that for the size of the containers loaded on board the *President Eisenhower*, the 15 inboard container stacks of bay 42 had a maximum allowable weight of 120 metric tons, and the two outboard container stacks (one port and one starboard) each had a maximum allowable weight of 102 metric tons. The CSM also directed that each container stack be arranged with heavier containers on the bottom, the next containers progressively lighter, and the top container as lightest in the stack.

1.3.2.2 Verified Gross Mass of Containers

The booking agent conducted an internal investigation into the container loss and found that during the booking process, a shipping reservation for 40 containers was automatically flagged in the booking system due to a single overweight container. To resolve the issue, the booking agent split the reservation into two bookings: one with the single overweight container and one with the other 39 containers. An error in the booking system prevented the shipper's information, particularly the cargo weights, from automatically populating in the new booking, so the cargo weights for each of the 39 containers had to be re-entered manually. During the manual entry, the 39 container cargo weights were each incorrectly entered by the booking agent as 2,500 kilograms (5,511 pounds). The system automatically added the incorrect cargo weight with the tare weight of each container, which produced a VGM between 6.2 and 6.4 metric tons for each of the 39 containers.[10] These incorrect VGMs were then given to the ship planner team and used to create the cargo loading plan. According to the bill of lading provided by the shipper, the reported (actual) VGM for the 39 containers ranged between 24.5 and 28.6 metric tons.

Of the 39 containers with an incorrect VGM, ten were loaded on the port side of bay 42 in the upper tiers of rows 16, 14, 12, 10, 8, and 6 (see figure 6). Another ten of the containers were loaded on the starboard side of bay 42 also in the upper tiers of rows 5, 7, 9, 11, 13, and 15, and above the other three damaged containers. Of the remaining containers, five were stowed below deck in bay 42, and 14 were loaded in bay 30. The ship planner and operating company found that when the actual weights of the containers in bay 42 for the voyage to Oakland were inputted into the loading plan, "lashing forces were found to be exceeded … causing lashing failure."

[9] All the containers loaded in bay 42 were International Standardization Organization (ISO) type 45G1 or 45R1 containers and had the same dimensions of 40 feet long, 9 feet 6 inches tall, and 8 feet wide.

[10] *Tare weight* is the empty weight of a container before any cargo is loaded.

According to the operating company, "the vessel would not have sailed with that configuration, had it been known."

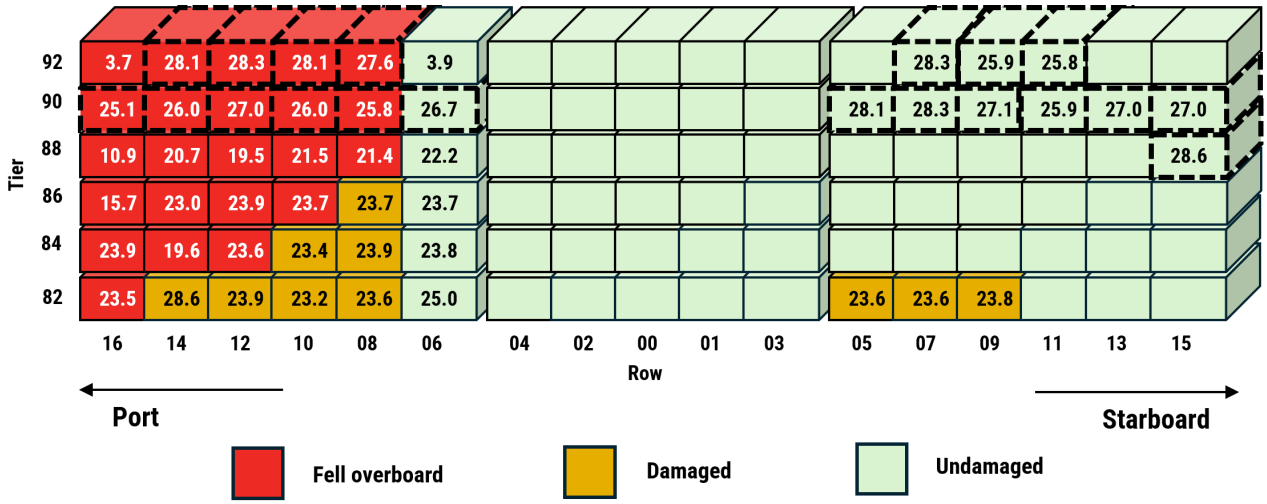

Figure 6. Bay 42 container stacks showing the location of the lost and damaged containers as well as the actual, shipper-provided VGM for each container in metric tons. The containers with the incorrect VGMs on the cargo loading plan are outlined with a dashed line.

As a result of the container loss, the booking agent modified their procedures and booking system to automatically capture the VGM from the original booking when a shipping reservation is modified and require individual verification of reported VGMs of less than 10 metric tons.

1.3.3 Navigating in Adverse Weather

As part of its SMS, the operating company maintained a "Navigating in Adverse Weather" document, which outlined procedures for navigating in adverse weather and the requirement for the officer-on-watch to monitor weather and sea conditions that could lead to dangerous vessel motions such as synchronous roll, parametric roll, high waves attack, and surf riding. This document contained thresholds and corresponding risk levels for wind speed, sea state, wave height, wave length, and wave period. In addition, per the SMS, the officer-on-watch was required to use onboard route monitoring software "at least once a watch" to assess the possibility for adverse weather leading to dangerous vessel motions based on inputted vessel stability values. Neither the SMS, CSM, or route monitoring software prescribed a maximum roll limit, and on the day of the casualty, the crew determined that the conditions did not meet SMS criteria for adverse weather.

2 Analysis

On February 6, the containership *President Eisenhower* was drifting in the Pacific Ocean about 94 miles from the Port of Oakland when the crew discovered 23 shipping containers from bay 42 were lost overboard. The crew subsequently discovered an additional 10 containers were damaged.

Four days before the casualty, longshoremen had loaded containers in bay 42 in accordance with a cargo loading plan developed by ship planners using the VGM of each container provided by the booking agent. However, after the casualty, the booking agent found that an administrative error—wherein the cargo weights for 39 containers were inputted incorrectly—resulted in the VGMs for those 39 containers being significantly underreported on the cargo loading plan. The actual VGM for the 39 containers was 18.3 to 22.2 metric tons greater than the VGM used to develop the cargo loading plan. Of these 39 containers, 20 were loaded in stacks on the hatch covers in bay 42.

Ten of the containers with an incorrect VGM on the cargo loading plan were loaded on the port side of bay 42, where the container loss occurred. The actual weight of these ten containers was between 25.1 and 28.3 metric tons, leading to container stack weights that exceeded the maximum stack weight limit in the operating company's CSM by up to 26% (see table 1). Because the cargo loading plan for bay 42 included inaccurate VGMs, the stack weights exceeded the CSM's allowance, and the forces acting on both the containers and the cargo-securing equipment were greater than what was expected. Additionally, since the container VGMs were incorrect on the cargo loading plan, the container stacks on the port side of bay 42 were inadvertently arranged with heavier containers in the upper tiers and progressively lighter containers toward the bottom tiers—an arrangement called reverse stratification. This arrangement resulted in the stacks having a higher center of gravity than stacks arranged with the heaviest containers on the deck and progressively lighter containers above—referred to as normal stratification. Normal stratification is preferred because it creates a container stack with the lowest possible center of gravity. The cargo securing equipment (twist locks and lashings) on a reverse-stratified container stack would be subjected to increased forces from vessel motion while underway at sea. Therefore, the loading of containers in overweight and reverse-stratified stacks in bay 42 increased the likelihood of a cargo-securing equipment failure. After the casualty, the booking agent modified their procedures and booking system to prevent this type of input error from occurring in the future.

Table 1. Total weight of each portside container stack of bay 42 (shown in metric tons).

Bay 42	Total stack weight limit from CSM	Total stack weight as shown on cargo loading plan	Actual total stack weight	% of max stack weight
Row 16	102	83.9	102.8	101%
Row 14	120	104.7	146.2	122%
Row 12	120	103.7	151.2	126%
Row 10	120	104.4	145.9	122%
Row 8	120	105.4	145.9	122%
Row 6	120	104.9	125.3	104%

Because the cargo loading plan was created using inaccurate data, it showed—incorrectly—that the stack weights on the port side of bay 42 were within the maximum total stack weight limitations prescribed in the operating company's CSM. The VGM of the containers was not verified at the terminal, and there were no issues during the loading operations. Additionally, before departure, the recorded draft was within the 0.2 meters (0.7 feet) of acceptable variance, or "correction factor," when compared to the calculated draft in the cargo loading and stability software. The expected mean draft from the cargo stability and loading software when the *President Eisenhower* departed Los Angeles was 9.62 meters (31.6 feet) with a calculated displacement of 72,351 metric tons. In this loading condition, the vessel's tons per centimeter immersion was about 93 (meaning it would take an additional 93 metric tons of weight to increase the vessel's mean draft by 1 centimeter). Due to the underreported container weights in the cargo loading plan, there were about 835 metric tons of additional cargo not accounted for in the draft calculations (415 metric tons above the hatch covers in bay 42, and a maximum of about 420 metric tons of additional cargo loaded in cargo holds of bays 42 and 30). Based on the loading conditions, the additional cargo weight would have increased the *President Eisenhower*'s mean draft by about 9 centimeters, or .09 meters, and resulted in a calculated mean draft of 9.71 meters (31.9 feet). This was closer to the recorded mean draft of 9.75 meters (32.0 feet) before the vessel departed Los Angeles, but the difference was still within the allowable correction factor of 0.2 meters. As such, there were no indications that the container stacks in bay 42 were overweight during loading operations or while preparing to depart from Los Angeles.

After the casualty, the vessel operator found that the overweight and reverse-stratified container stacks exceeded the calculated "lashing forces," which

caused the cargo-securing equipment to fail. As loaded upon departure from Los Angeles, some stack weights for bay 42 would have exceeded the CSM's maximum allowable stack weight, and if known, the vessel would not have been able to sail. Despite this, the vessel successfully transited from Los Angeles to Oakland (underway about 4 days) without issue. Additionally, about 1000, after the vessel arrived outside the Port of Oakland, a crewmember had inspected the containers' lashings and found nothing amiss. Throughout the day, the vessel drifted while awaiting entrance to the Port of Oakland, and increased wind and seas caused the vessel to roll at 18°. The weather and sea conditions did not meet the adverse weather thresholds as defined in the operating company's SMS, and there was no roll limit prescribed in the SMS, CSM, or onboard route monitoring software, so the crew took no action to address the rolling. However, the 18° rolls were significantly higher than what the vessel had previously encountered on the transit (reported at a maximum 5°). After the casualty, the classification society found lashing plate and socket damage, indicating that the lashings became overloaded and pulled free. The increased rolling magnitude from seas would have increased the compression forces acting on the containers within the stacks and the racking forces acting on the cargo-securing equipment until the equipment failed, resulting in the container damage and loss.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the container loss aboard the containership *President Eisenhower* was the input of incorrect cargo weight for 39 containers when the cargo loading plan was developed by shoreside planners, resulting in the containers being loaded in overweight and reverse-stratified stacks, causing cargo-securing equipment to fail while the vessel was drifting.

Vessel Particulars

Vessel	*President Eisenhower*
Type	Cargo, General (Containership)
Owner/Operator	President Eisenhower Trust/APL Maritime, Ltd. (Commercial)
Flag	United States
Port of registry	Wilmington, Delaware
Year built	2005
Official number (US)	1284569
IMO number	9295220
Classification society	DNV
Length (overall)	983.9 ft (299.9 m)
Breadth (max.)	140.2 ft (42.8 m)
Draft (casualty)	32.8 ft (10.0 m)
Tonnage	82,794 GT ITC
Engine power; manufacturer	93,120 hp (69,440 kW); MAN B&W/ Hyundai Heavy Industries, 12K98MC-C, slow-speed diesel engine

NTSB investigators worked closely with our counterparts from **Coast Guard Sector San Francisco** throughout this investigation.