MINNESOTA DEPARTMENT OF LABOR & INDUSTRY

This boiler was too small for inspection

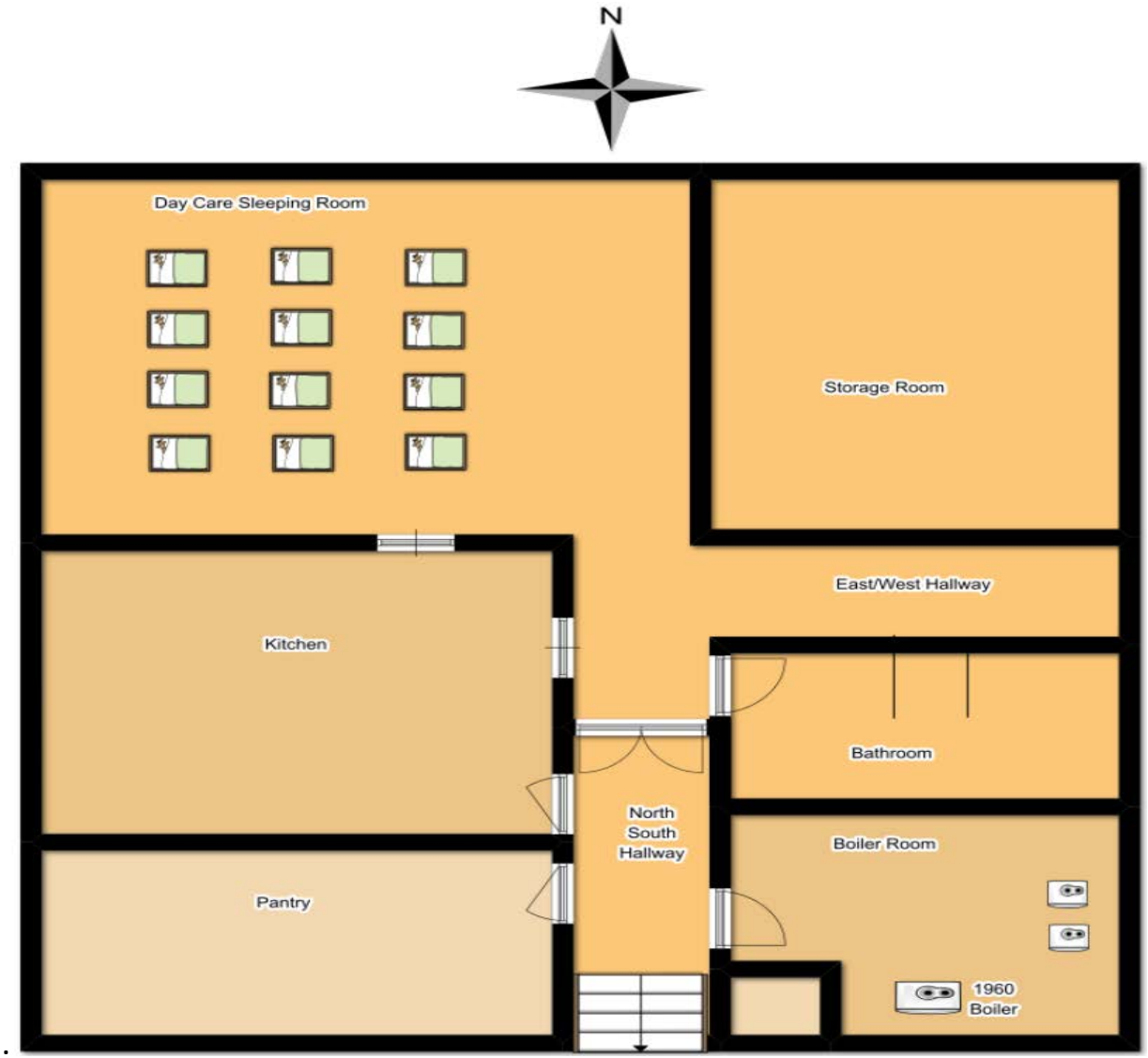
An investigation into a boiler explosion by State Boiler Inspectors David Gonsoski and Tom Boyle and insurance company inspector John Glynn

The following investigation report is for a 1960 Weil McClain hot water heating boiler (pictured below) that had a BTU input of 625,000. This boiler accident happened in February 2013.

Minnesota does not require a licensed operator or an annual inspection for hot water heating boilers with BTU input ratings of 750,000 or less.

The subject of the accident, boiler No. 1, was originally connected with another boiler of the same size. In 2000, the second boiler was removed. In 2001, the facility created two separate heating systems for the buildings. This allowed them to install two additional, smaller boilers, on a separate system, to heat a portion of the building while the 1960 Weil McClain boiler alone heated the rest of the building. After the change, because both boiler systems were less than 750,000 BTUs, this location was no longer required to have a licensed engineer operate the boiler, and not required to have an inspection by a commissioned boiler inspector.

Building layout



According to the investigation, the heating system for this boiler had a leak somewhere, and employees were constantly adding water to the system. One of the maintenance personnel believed he had fixed the leak so he isolated the make-up water to the boiler. In doing so it is also believed that the low-water cutout was isolated from the boiler. This allowed the low-water cut-off to remain full of water. The boiler system still had a leak and the boiler continued to slowly drain.

Even after the boiler was empty of water, the boiler continued to fire. It is undetermined if a zone valve opened, but water made it back to the now red-hot boiler and caused the pressure boundary to fail. This resulted in a catastrophic explosion causing extensive damage to the building.

The following pictures document the results of the boiler explosion. The explosion and damage happened in less than a second, without warning, by a boiler that was rated too small for inspection.

This image shows the condition of the boiler room after the explosion.

This photo shows the two small, newer boilers in the boiler room now relocated approximately 12 feet from their original location.

This picture shows what is left of the wall that separated the boiler room from the north/south hallway.

This image is looking further into the back of the boiler room where the Weil McClain boiler was located. Notice the destroyed I-beams and concrete in the ceiling. The piece of light blue and rusty metal in the front of the picture is part of the boiler skin/shell.

This image is looking south in the north/south hallway. Notice the white marks on the right wall from the cement blocks of the left wall hitting the right wall. The doorway on the far right is the door to the pantry. The water heater on the left is in the boiler room and was behind the wall that was disintegrated.

This image is looking south down the north/south hallway. The first door on the right is the kitchen entrance door. The second door on the right is the pantry entrance door. The large opening on the left is where the boiler room door was located, the first door on the left is the entrance to the bathroom, and the two things hanging from the ceiling near the front of the picture are the door closers for the double doors.

Here is a different view of the north/south hallway from the north looking at the kitchen entry door that was smashed by concrete block projectiles.

This view is looking from the boiler room into the pantry. Notice the pantry door is completely gone, and the frame from the boiler room door is lying in the rubble on the floor.

This image is looking south in the north/south hallway. The entrance on the left is the entrance to the bathroom.

This image looks at the damage in bathroom from hallway near boiler room entrance. Notice the destruction of the bathroom stalls. These stalls were located 18 feet away from the boiler and behind a six-inch-thick concrete block wall.

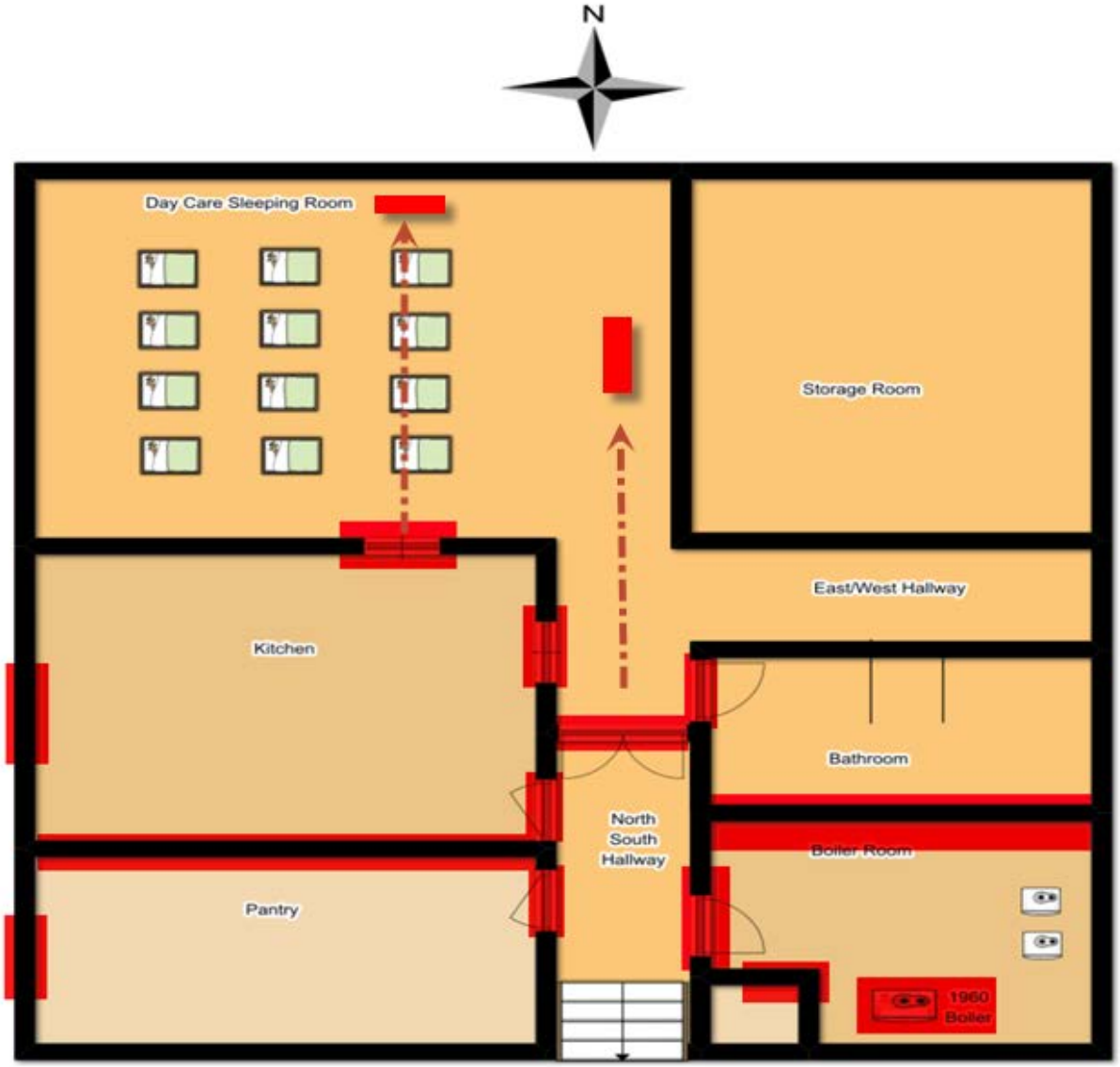
The first floor above the boiler room also received extensive damage.

Here is the kitchen exterior wall.

A photo of the damaged roll-up doors for the kitchen.

A photo of the damaged roll-up doors for the kitchen.

Here is one of the double doors from the north/south hallway. The door is now in the middle of the daycare sleeping room 50 feet from its original location.

Here is of the daycare sleeping room. Notice the kitchen's damaged roll-up window cover and debris along the left side of the room.

The highlighted walls were completely destroyed, including the first floor above the boiler room.