

BEYOND MISINFORMATION

What Science Says About the Destruction of
World Trade Center Buildings 1, 2, and 7



ARCHITECTS
& ENGINEERS
for 9/11 TRUTH

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Introduction

What caused the destruction of the World Trade Center Twin Towers and Building 7 on September 11, 2001? More than a decade later, this question continues to be discussed by many people around the world.

According to the official explanation, the World Trade Center Twin Towers (WTC 1 and WTC 2) collapsed due to damage from airplane impacts and ensuing fires, while World Trade Center Building 7 (WTC 7), a 47-story skyscraper also in the World Trade Center complex, collapsed completely and symmetrically into its own footprint due to office fires ignited by debris from the earlier collapse of WTC 1. Though few people have studied it closely, a majority of the public, including most architects, engineers, and scientists, accept the official explanation.¹

Much of the public, however, including a considerable number of architects, engineers, and scientists, do not accept the official explanation.^{2,3} Among those who reject it, the most common explanation is that WTC 1, WTC 2, and WTC 7 were destroyed in a procedure known as “controlled demolition,” whereby carefully placed explosives or other devices are detonated to bring down a structure in a desired manner. September 11, 2001, aside, every total collapse of a steel-framed high-rise building in history has been caused by controlled demolition.

According to this second explanation, the demolition of WTC 1, WTC 2, and WTC 7 would need to have been prepared before September 11, 2001, by demolition experts who had unrestricted access to the buildings. This explanation also implies that the demolition was planned in coordination with the other attacks of that day. Most importantly, if the goal were to make it appear that the airplanes had caused the destruction of the buildings, it could not be left to chance that airplanes would successfully crash into WTC 1 and WTC 2. This explanation, therefore, contradicts the official account of 9/11.

What Does Science Say?

The purpose of this booklet is to provide a careful examination of these competing explanations — which we will refer to as “hypotheses” from this point forward — and a comprehensive overview of the available evidence, so that readers can begin to evaluate which of the two hypotheses is more consistent with the evidence. Because this booklet only skims the surface of this subject, readers are strongly encouraged to study the official reports and the papers referenced herein before reaching their own conclusions.

The position taken in the following chapters is that very little of the evidence can be explained by the hypothesis of fire-induced failure and that all of it can be explained by the hypothesis of controlled demolition. Nonetheless, this booklet will make the best attempt to describe how the authors of the official reports have explained the evidence according to their hypothesis. In many cases, however, we will find that the authors of the official reports denied or ignored the available evidence.

In the end, the goal is to move our collective understanding of the World Trade Center’s destruction beyond misinformation so that we as a society may arrive at an accurate account of one of the most important events in our recent history.



The World Trade Center site in New York City. The former footprints of WTC 1 and WTC 2 are center. The former footprint of WTC 7 is at the bottom left.

1

Formulating a Hypothesis



Before and after photos of World Trade Center Building 7.

This chapter provides a starting point from which to examine the competing hypotheses of fire-induced failure and controlled demolition. First, it will review the history of high-rise building fires and failures. Then it will examine the features that distinguish fire-induced failure and controlled demolition.

One principle of the scientific method is especially relevant in the early stage of an investigation when data is being gathered and a hypothesis is being formulated. “Unprecedented causes should not, without good reasons, be posited to explain familiar occurrences,” observes David Ray Griffin, a professor emeritus of Philosophy of Religion and Theology who has written extensively about the philosophy of science and about the events of September 11, 2001. “[W]e properly assume, unless there is extraordinary evidence to the contrary, that each instance of a familiar occurrence was produced by the same causal factors that brought about the previous instances.”¹

With that principle in mind, we will review the history of high-rise building fires and failures to help

us establish what should be considered, or should have been considered, the most likely hypothesis for the destruction of WTC 1, WTC 2, and WTC 7.

High-Rise Building Fires and Failures

The history of steel-framed high-rise buildings spans about 100 years. Setting aside the events of September 11, 2001, **every total collapse of a steel-framed high-rise building during that period of time has been caused by controlled demolition. In comparison, fires have never caused the total collapse of a steel-framed high-rise building**, though high-rise building fires occur frequently.

Modern steel-framed high-rises generally endure fires without being structurally compromised because they have fire protection to prevent the steel from heating to the point where it loses a significant amount of its strength. This is usually in the form of gypsum board (drywall), concrete, or sprayed-on insulation.

To illustrate the performance of steel-framed high-rise buildings throughout history, let us first examine the instances in which fires *have* caused the total or partial collapse of high-rise buildings.

In 2002, the National Institute of Standards and Technology (NIST) conducted an international historical survey of fires in multi-story buildings (defined as four or more stories) of all kinds that

and WTC 2 as fire-induced failures. In the chapters ahead, we will examine whether the structural damage and reported dislodging of fireproofing are sufficient reasons to differentiate WTC 1 and WTC 2 from other steel-framed high-rise buildings that have experienced fires.

The results of NIST's survey were as follows:

Partial Collapses

Of the 22 fire-induced collapses, 15 were partial collapses, with five of those occurring in buildings that were comparable to WTC 1, WTC 2, and WTC 7 in terms of size or construction (over 20 stories or steel-framed or both). The five are:

- **One New York Plaza**, a 50-story steel-framed building that experienced local connection failures resulting in filler beams on the 33rd and 34th floors dropping onto their supporting girders;
- **Alexis Nihon Plaza**, a 15-story steel-framed building in Montreal, Canada, that experienced a partial collapse of its 11th floor;
- **WTC 5**, a nine-story steel-framed building in the WTC complex that experienced partial collapses of four floors and two bays on September 11, 2001;
- **The Jackson Street Apartments**, a 21-story reinforced concrete building in Hamilton, Ontario, Canada, that experienced the partial collapse of a floor/ceiling assembly; and
- **CESP 2**, a 21-story reinforced concrete building in Sao Paulo, Brazil, that experienced a substantial partial collapse of its central core.

The remaining 10 partial collapses occurred in buildings with eight or fewer stories and constructed of materials including concrete, brick, wood, or masonry with cast iron. None were steel-framed.

Total Collapses

Of the 22 fire-induced collapses, seven of them (including WTC 1, WTC 2, and WTC 7) were total collapses. WTC 1, WTC 2, and WTC 7 stand out from the



WTC 5 on September 11, 2001.



WTC 5 on September 21, 2001.

resulted in total or partial collapse.² From news databases, published literature, and direct inquiries with 23 organizations, the survey identified 22 fire-induced collapses between 1970 and 2002.

Originally, the survey included WTC 1, WTC 2, and WTC 7. However, it was revised in 2008 to remove WTC 1 and WTC 2, because, according to NIST, their destruction did not result solely from fire, but from a combination of structural damage, dislodged fireproofing, and fire caused by the airplane impacts. However, in this chapter, because fire was reportedly the proximate cause, we will discuss WTC 1

other four buildings, which ranged from four stories to nine stories and were made of concrete, wood, or unknown materials.

In summary, the survey identified four other documented instances in which fires caused the total collapse of a multi-story building. None were steel-framed and the tallest was nine stories. Fifteen buildings suffered partial fire-induced collapse, but only five of them occurred in buildings that were over 20 stories and/or steel-framed. The survey concluded, "A fire-induced collapse in a multi-story building can be classified as a low-frequency, high-consequence event."

Other notable fire-induced collapses have occurred since 2002. In 2005, the 29-story Windsor Tower in Madrid, Spain, constructed of steel exterior columns and reinforced concrete core columns, burned for almost 24 hours and suffered a partial collapse, in



The Windsor Tower in Madrid, 2005.



The Windsor Tower after having burned for almost 24 hours.

stages over several hours, of floors where the steel support columns and beams had no fire protection. In 2008, the 13-story Delft University Faculty of Architecture Building in the Netherlands, constructed of reinforced concrete, burned for seven hours and experienced a partial collapse of a 13-story section of the building. Yet there remains no documented instance of a steel-framed high-rise building suffering total collapse from fire, and only a small number have experienced partial collapse.

Let us now examine the incidence of high-rise building fires that do not cause total or partial

collapse. In 2013, the National Fire Protection Association (NFPA) published the most recent edition of its periodic report titled **High-Rise Building Fires**. According to the report, which defines high-rise buildings as having seven stories or more, there were an estimated 15,400 high-rise building fires in the U.S. annually from 2007 to 2011. Fifty percent of those occurred in buildings typically considered high-rise buildings (that is, with multiple separate floors such as apartments, hotels, facilities that care for the sick, and offices). The incidence in that five-year stretch is similar to the number of fires observed in earlier time periods.

The NFPA report notes that, by most measures, the risks of fire and of associated losses are lower in high-rise buildings than in other buildings of the same property use. The difference, says the report, can be attributed to the much greater use of fire protection systems and features in high-rise buildings as compared to shorter buildings.

In terms of buildings that are more comparable to WTC 1, WTC 2, and WTC 7, the report estimates that 1,610 fires occur each year in buildings with 13 or more stories. Since the report does not categorize fires by size, severity, or duration, it is difficult to tell how many of these fires are comparable to the fires in WTC 1, WTC 2, and WTC 7.

One method of comparison, though, is to identify high-rise building fires that resulted in significant fire damage and property loss. Using those criteria, NIST's 2002 historical survey (updated in 2008), referenced above, identified seven major high-rise building fires that did *not* result in total or partial collapse. Those included:

- **One Meridian Plaza** in Philadelphia, PA (height: 38 stories; fire duration: 19 hours)
- **Mercantile Credit Insurance Building** in Basingstoke, United Kingdom (height: 12 stories; fire duration: unknown)
- **Broadgate Phase 8** in London, United Kingdom (height: 14 stories; fire duration: 4.5 hours)
- **First Interstate Bank** in Los Angeles, CA (height: 62 stories; fire duration: 3.5 hours)
- **MGM Grand Hotel** in Las Vegas, NV (height:

26 stories; fire duration: 8 hours)

- **Joelma Building** in Sao Paulo, Brazil (height: 25 stories; fire duration: one hour and 40 minutes)
- **Andraus Building** in Sao Paolo, Brazil (height: 31 stories; fire duration: unknown)

The NIST survey also noted two major fire test programs conducted at the Building Research Establishment (BRE) Laboratories in Cardington, United Kingdom. The first series of tests, conducted on a representative eight-story composite steel-framed office building, resulted in significant fire damage but did not result in collapse, even with unprotected steel floors. The second series of tests conducted on a seven-story concrete building also did not result in collapse.

Given the high frequency of fires in steel-framed high-rise buildings and the low frequency of fire-induced collapses, the probability when a fire occurs in a steel-framed high-rise building that it will result in a *partial* collapse is extremely low. The probability that it will result in a *total* collapse appears to be even lower.

Let us take WTC 7 as an example. According to the official explanation, its collapse was due solely to normal office fires and not from structural damage caused by debris. The probability when WTC 7 caught fire that it would totally collapse as a result of those normal office fires was exceedingly low.



BRE tests in Cardington, United Kingdom.

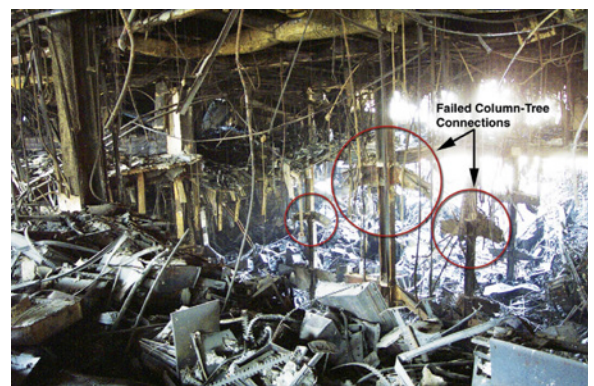
The Features of Controlled Demolition vs. Fire-Induced Failure

Let us now move from examining the *occurrence* of collapse to the *manner* of collapse produced by controlled demolition and fire-induced failure, respectively. Table 1 on the following page lists several common features that generally distinguish controlled demolitions and fire-induced failures.

As Table 1 illustrates, the corresponding features of controlled demolition and fire-induced failure are virtually the opposite of each other. Not every controlled demolition exhibits all of the features of controlled demolition listed in Table 1, nor does every fire-induced failure exhibit all of the features of fire-induced failure listed in Table 1. However, there is very little crossover: When a building's cause of collapse is controlled demolition, the building exhibits virtually none of the features of fire-induced failure. Similarly, when a building suffers a fire-induced failure, it exhibits virtually none of the key features of controlled demolition (with the exception



Fire damage in WTC 5 (2002 NIST survey of fires that resulted in total or partial collapse).



Partial connection and floor failures in WTC 5 (2002 NIST survey of fires that resulted in total or partial collapse).

Table 1: The Features of Controlled Demolition versus Fire-Induced Failure

CONTROLLED DEMOLITION	FIRE-INDUCED FAILURE
The collapse is total, leaving virtually no parts of the building standing.	The collapse is usually partial (always partial in the case of steel-framed buildings), leaving much of the building standing.
The onset of collapse is always sudden.	The onset of collapse is gradual, with visible building deformations appearing prior to the actual collapse.
The collapse lasts a matter of seconds.	The collapse takes place over many minutes or hours.
The collapse typically starts at the base of the building, though they can be engineered as top-down also.	The collapse occurs randomly anywhere in the building.
The building descends symmetrically through what was the path of greatest resistance, though asymmetrical collapses are sometimes engineered on purpose.	Collapse is always asymmetrical.
The building typically descends to the ground at near free-fall acceleration.	The descent of falling portions of the building is slowed or stopped by the lower sections of the building.
“Demolition squibs” (isolated explosive ejections) are visible outside the main zone of destruction.	Explosions only occur at the location of fires, if at all.
Concrete and other materials are sometimes pulverized, resulting in fine dust clouds.	Concrete and other materials are not pulverized. Most of the building’s remaining structure is left intact or in large sections.
The building’s steel structure is totally or mostly dismembered.	The building’s steel structure is left mostly intact, even if heavily damaged.

of the four smaller non-steel-framed buildings that NIST’s 2002/2008 survey identified as having suffered total collapse from fire).

If we look closely at the five buildings in NIST’s survey that were over 20 stories or steel-framed or both, and that suffered partial fire-induced collapse, we find that none of them exhibited the features of controlled demolition in Table 1 above.

- **One New York Plaza** experienced local connection failures resulting in filler beams dropping onto their supporting girders on two floors.
- **Alexis Nihon Plaza** experienced a partial collapse of its 11th floor, which was arrested by the floor below it.
- **WTC 5** experienced partial collapses of four floors and two bays.

- **The Jackson Street Apartments** experienced the partial collapse of a floor/ceiling assembly.

- **CESP 2** experienced a substantial partial collapse of its central core. The degree of deformation prior to collapse is unknown. Other than possibly experiencing little deformation prior to collapse, CESP 2 exhibited no other feature of controlled demolition.

In comparison, as we will discuss in the chapters ahead, the destruction of WTC 7 exhibited all of the features of controlled demolition listed in Table 1, while WTC 1 and WTC 2 exhibited eight out of the nine features listed in the table (the collapse WTC 1 and WTC 2 did not start at their bases).



Debris from the demolition of the Grand Palace Hotel/Claiborne Towers building, New Orleans.



Debris from the demolition of an unidentified building.

What Is the Most Likely Hypothesis?

We now have two main observations to help us establish the most likely hypothesis for the destruction of WTC 1, WTC 2, and WTC 7. First, the probability of fire causing the total collapse of a steel-framed high-rise building is exceedingly low. Such an event has never occurred prior to or since September 11, 2001. On the other hand, every total collapse of a steel-framed high-rise building in history has been caused by controlled demolition. Second, fire-induced failures exhibit virtually none of the features of controlled demolition. Yet, as could be seen on the day of September 11, 2001, the destruction of WTC 1, WTC 2, and WTC 7 exhibited nearly all of the features of controlled demolition and none of the features of fire-induced failure.

If the destruction of WTC 1, WTC 2, and WTC 7 were caused by fire, this would make them the first steel-framed high-rise buildings in history to suffer total fire-induced collapse (combined with structural damage from the airplane impacts in the case of WTC 1 and WTC 2). They would also be the first fire-induced collapses to exhibit nearly all of the features of controlled demolition and none of the features of fire-induced collapse. Edward Munyak, a fire protection engineer, puts it this way: “Even one progressive global collapse would have been extraordinary. But to have three occur in one day was just beyond comprehension.”

Let us revisit the principle introduced at the beginning of this chapter:

“Unprecedented causes should not, without good reasons, be posited to explain familiar occurrences... [W]e properly assume, unless there is extraordinary evidence to the contrary, that each instance of a familiar occurrence was produced by the same causal factors that brought about the previous instances.”

Indeed, we can properly assume, based on the above observations, that the most likely hypothesis for the destruction of WTC 1, WTC 2, and WTC 7 is that it was caused by controlled demolition. Only if there is extraordinary evidence to the contrary should an unprecedented cause be posited.

In the chapters ahead, we will examine whether that extraordinary evidence to the contrary exists — or not. ■



2 | The Official Investigations

This chapter provides a brief account of the investigations conducted by the Federal Emergency Management Agency (FEMA) and the National Institute of Standards and Technology (NIST) with a focus on how their hypotheses were developed over time. Toward the end are summaries of NIST’s final “probable collapse sequences,” which are the sequences of events that NIST claims led to the total collapse of the buildings. Whether the evidence supports the scenarios put forth by NIST will be discussed in the following chapters.

In the last chapter, we established that the most likely hypothesis for the destruction of WTC 1, WTC 2, and WTC 7 was that it was caused by controlled demolition. Let us now consider a second principle of the scientific method that is relevant in the early stage of an investigation. David Ray Griffin describes it as follows: “When there is a most likely explanation for some phenomenon, the investigation should begin with the hypothesis that this possible explanation is indeed the correct one.... Doing otherwise would suggest that [the investigators’] work is being determined by some extra-scientific motive, rather than the simple desire to discover the truth.”¹

With that principle in mind, we will now examine whether investigators started with or ever considered the most likely hypothesis.

The FEMA Building Performance Study

“‘It appeared to me that charges had been placed in the building,’ said Mr. Hamburger, chief structural engineer for ABS Consulting in Oakland, Calif. Upon learning that no bombs had been detonated, ‘I was very surprised.’”



Many observers initially suspected that explosives were used in the destruction of WTC 1 and WTC 2 due to the rapid and explosive nature of the destruction.

COMMON MISUNDERSTANDINGS

“The Towers were a raging inferno.”

According to the NIST report: “At any given location, the duration and temperatures near 1,000°C, was about 15 to 20 min. The rest of the time, the temperatures were near 500°C or below.... The initial jet fuel fires themselves lasted at most a few minutes.”

“The fires melted the steel.”

Although some experts initially claimed that fires had melted the steel, the hypotheses put forward by FEMA and NIST never involved the steel becoming hot enough to melt. According to NIST, the highest air temperatures reached were 1,000°C (1,832°F), while steel melts at about 1,500°C (2,732°F).

had been detonated?” FEMA’s investigators were not granted access to the site until the week of October 7. Thus, neither he nor anyone else had conducted forensic analysis of the debris, nor had they interviewed eyewitnesses. From a scientific perspective, there was no basis for disconfirming

his initial hypothesis.

The likely answer is that between September 11 and the time that he was interviewed, the government and the media had put forth an account of the day’s events that was incompatible with his original assessment that the buildings had been brought down with explosives. Certainly, it would seem highly unlikely that Al-Qaeda could have gained access to the buildings and rigged them to be demolished without being detected. Therefore, as Hamburger essentially stated, he ruled out his initial hypothesis when he “learned” to his surprise that the official account did not include explosives being used to bring down the buildings.

Ronald Hamburger was not the only expert to rule out this initial hypothesis. On September 11, Van Romero, an explosives expert at New Mexico Tech, told the *Albuquerque Journal*, “The collapse of the buildings was ‘too methodical’ to be the chance result of airplanes colliding with the structures.... ‘My opinion is, based on the videotapes, that after the airplanes hit the World Trade Center there were some explosive devices inside the buildings that caused the towers to collapse.’” By September 21, Romero changed his opinion after “conversations with structural engineers,” telling his local newspaper, “Certainly, the fire is what caused the building to fail.”

Whatever causes experts like Hamburger and Romero might have initially suspected, within a week after September 11 there was no longer any question that fires had been the ultimate reason for the buildings’ demise. Even the precise mechanisms that triggered the collapses were agreed upon, according to engineer R. Shankar Nair, who would be a contributor to the FEMA investigation. “Already there is near-consensus as to the sequence of events that led to the collapse of the World Trade Center,” he told the *Chicago Tribune* on September 19.

At least that was the case for WTC 1 and WTC 2. WTC 7’s collapse, on the other hand, investigators were at a loss to explain. “Engineers and other experts, who quickly came to understand how hurtling airplanes and jet fuel had helped bring down the main towers, were for weeks still stunned by what happened to 7 World Trade Center,” *The New York Times* reported on November 29. “We know what happened at 1 and 2, but why did 7 come down?” said William Baker, a member of the FEMA team.

With fire-induced failure as its only hypothesis, the FEMA investigation proceeded for the next several months with significant constraints. As *New York Times* reporters James Glanz and Eric Lipton wrote:

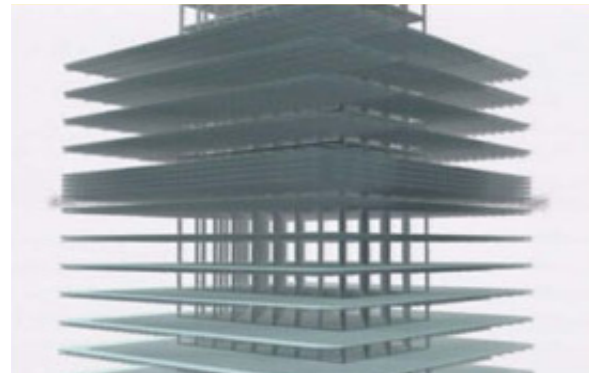
[T]he investigation was financed and given its authority by [FEMA], with which [lead investigator Gene] Corley's team had a shaky relationship from the start. For months after September 11, the investigators...were unable to persuade FEMA to obtain basic data like detailed blueprints of the buildings that collapsed. Bureaucratic restrictions often kept the engineers from interviewing witnesses to the disaster, making forensic inspections at ground zero, or getting crucial information like recorded distress calls from people trapped in the buildings. For reasons that would remain known only to FEMA, the agency refused to let the team appeal to the public for photographs and videos of the towers that could help with the investigation.²

Most detrimental to the team's ability to conduct forensic analysis was the City's recycling of the buildings' steel, which continued despite requests from the investigators — and outcry among the victims' families and the fire safety community — for the steel to be saved.³ Although investigators were eventually granted access to the scrap yards, nearly all of the steel, including most of the steel from the upper floors of WTC 1 and WTC 2, was destroyed before it could be inspected.⁴

FEMA released its report, titled ***World Trade Center Building Performance Study: Data Collection, Preliminary Observations, and Recommendations***, on May 1, 2002. As implied in the title, the report did not attempt to provide a definitive explanation for the destruction of each building. Instead, it posited scenarios in general terms while recommending further investigation to definitively determine the exact causes.

FEMA's scenario for WTC 1 and WTC 2 — which reflected common thinking at that time but was later ruled out by NIST — is what became known as the “pancake theory.” According to this hypothesis, the fires caused the floor trusses to lose their rigidity and sag. As a result of the sagging, the column-to-truss connections failed and the floors collapsed onto the floors below them. This precipitated “an immediate progressive series of floor failures,”

which left behind “tall freestanding portions of the exterior wall and possibly central core columns.” FEMA then stated, “As the unsupported height of these freestanding exterior wall elements increased, they buckled at the bolted column splice connections, and also collapsed. Perimeter walls of the building seem to have peeled off and fallen directly away from the building face, while portions of the core fell in a somewhat random manner.” FEMA also claimed that the upper sections of the buildings then acted as pile drivers, causing “a wide range of failures in the floors directly at and below the aircraft impact zone,” which progressed all the



This PBS NOVA animation attempts to illustrate the “pancake theory.”

way down to the base of the buildings.

Regarding WTC 7, FEMA reported that there was “no clear evidence of where or on which floor the initiating failure occurred,” but it put forward a number of “potential scenarios” involving fires on various floors on the east side of the building. Noting that those areas contained “little if any fuel” that would be required to feed fires hot enough and long-lasting enough to weaken the structure, the report suggested “a hypothesis based on potential rather than demonstrated fact” that diesel fuel from the buildings' emergency generators was the source of fire. Like the “pancake theory,” this hypothesis reflected common thinking at the time but was later ruled out by NIST. Toward the end of the report, however, FEMA observed:

The specifics of the fires in WTC 7 and how they caused the building to collapse remain unknown at this time. Although the total diesel fuel on the premises contained massive potential energy, the best hypothesis has only a low probability of occurrence.

Thus, rather than pursuing the most likely hypothesis for WTC 7's destruction, **FEMA posited a hypothesis that it found no evidence for; that involved an unprecedented cause; and that it acknowledged had "only a low probability of occurrence."**

The NIST Investigation

Amid a growing sense that the FEMA Building Performance Study was insufficient for the task of conducting a full-scale investigation, NIST began planning its own investigation in October 2001 to eventually succeed FEMA's. The NIST investigation was announced on August 21, 2002, and was scheduled to take 24 months.

Although a new agency was assuming the task of investigating the World Trade Center destruction, a number of key members of the FEMA Building Performance Study would come to have principal roles in the NIST investigation. Some of them included:

- **Therese McAllister** and **John Gross**, who became Co-Project Leaders of the most important part of the NIST investigation, "Structural Fire Response and Collapse Analysis." McAllister had been the editor

of the FEMA Building Performance Study and the Chapter Leader of the report's introduction. Gross had been a contributing author to the introduction.

- **Ronald Hamburger**, whose firm was awarded the most important contract related to WTC 1 and WTC 2: a study of the thermal-structural response of the buildings to the fires. Hamburger had been the Chapter Leader of FEMA's chapter on WTC 1 and WTC 2. As discussed above, Hamburger initially thought that "charges had been placed in the building" but apparently ruled out this hypothesis when he

learned it was not compatible with the official account.

- **Ramon Gilsanz**, whose firm was awarded the most important contract related to WTC 7: the development of structural models and collapse hypotheses for WTC 7. Gilsanz had been the Chapter Leader of FEMA's chapter on WTC 7.

In its final plan, released in August 2002, NIST acknowledged that fire had never caused the total collapse of a high-rise building prior to September 11, 2001. Nonetheless, it pursued its hypothesis confidently, even going so far as to declare it as fact: "The WTC Towers and WTC 7 are the only known cases of total structural collapse in high-rise buildings where fire played a role."

NIST's first progress report in December 2002 did not discuss hypotheses in any detail. In May 2003, it released a second progress report, which laid out three leading hypotheses for the destruction of WTC 1 and WTC 2. One was FEMA's "pancake theory" involving the failure of floor connections. Another suggested that the floor connections held strong, which then allowed the sagging floors to pull the exterior columns inward until they buckled. This would become the main initiating mechanism in NIST's probable collapse sequence (see Table 2). The third hypothesis posited direct fire-induced column failure. The May 2003 progress report, however, did not explore hypotheses for the destruction of WTC 7.

In June 2004, NIST released a third, much more extensive progress report containing interim findings and a working hypothesis for the destruction of WTC 1 and WTC 2 — and this time WTC 7. Although the working hypothesis for WTC 1 and WTC 2 described the overall sequence of events from airplane impact to collapse initiation in relatively clear steps, NIST did not settle on an initiating mechanism or on a location in either building where it might have occurred. In regards to WTC 7, NIST suggested that an initial local failure somewhere below Floor 13, caused by fire and/or structural damage, triggered a column failure and subsequent vertical progression of failures up to the east penthouse. The resulting damage, NIST hypothesized, set off a horizontal progression of failures across the lower floors, resulting in disproportionate collapse of the entire building.

COMMON MISUNDERSTANDINGS

"WTC 7 collapsed because of the diesel fuel fires."⁵

Although this was a leading hypothesis for several years, FEMA and NIST found no evidence to support it and NIST eventually ruled it out, stating, "Diesel fuel fires did not play a role in the collapse of WTC 7."

"WTC 7 collapsed because of a massive, extremely hot fire. It was a raging inferno."⁶

NIST concluded that the fires in WTC 7 were not unusual or extreme. In its final report it stated: "The fires in WTC 7 were similar to those that have occurred in several tall buildings where automatic sprinklers did not function or were not present." The thermal expansion of beams that initiated the collapse occurred "at temperatures hundreds of degrees below those typically considered in design practice for establishing structural fire resistance ratings."

NIST's working hypothesis for the destruction of WTC 7 was further elaborated in a *Popular Mechanics* article from March 2005, which said: "NIST researchers now support the working hypothesis that WTC 7 was far more compromised by debris than the FEMA report indicated.... NIST investigators believe

a combination of intense fire and severe structural damage contributed to the collapse."

In April 2005, NIST announced that its technical work was nearly finished and that a draft report on WTC 1 and WTC 2 would be released for public comment in June 2005, followed by the final report in

September 2005. NIST also announced for the first time that its report on WTC 7 would be released as a supplement to the other report, with a draft report due in October 2005 and the final report slated for December 2005. This schedule for the WTC 7 report was repeated at a public briefing on June 23, 2005.

In its April 2005 progress report, NIST addressed the subject of the controlled demolition hypothesis for the first time — but only in relation to WTC 7: "NIST has seen no evidence that the collapse of WTC 7 was caused by bombs, missiles, or controlled demolition." NIST did not describe what methods it used to search for evidence of controlled demolition. Whether it conducted an adequate search for such evidence will be discussed in later chapters.

Then, in September 2005, at a three-day technical conference where NIST released its final report on WTC 1 and WTC 2 (see Table 2 for a summary of NIST's final probable collapse sequence), it announced that its report on WTC 7 would be further postponed, with the technical work being completed in January 2006, the draft report for public comment scheduled for May 2006, and the final report finished in June 2006.

But NIST ended up significantly extending that timeline. A report that in June 2005 was set for release by the end of that year would end up being released almost three years later. In a March 2006 *New York Magazine* interview, NIST lead investigator Dr. Shyam Sunder provided some possible insight into why the report was delayed so long. When asked about

COMMON MISUNDERSTANDINGS

"WTC 7 was severely damaged by debris from WTC 1; it wasn't just the fires that made it collapse."⁷

Although NIST considered this hypothesis, it eventually ruled it out, stating, "Other than initiating the fires in WTC 7, the damage from the debris from WTC 1 had little effect on initiating the collapse of WTC 7."

Table 2: Summary of NIST's Probable Collapse Sequence for WTC 1 and WTC 2

STEP 1: Structural Damage from Airplane Impact

The impact of the airplane severed 35 exterior columns and six core columns in WTC 1. An additional two exterior columns and three core columns were heavily damaged. In WTC 2, the impact of the airplane severed 33 exterior columns and 10 core columns. An additional exterior column and core column were heavily damaged.

STEP 2: Redistribution of Loads

The damage to exterior columns caused their loads to be redistributed mostly to the columns next to the impact zones. Damage to the core columns was distributed mostly to the core columns next to them that were still intact, and to a lesser extent to the exterior columns via the hat truss and floor systems. Additional loading redistribution occurred as some core columns were weakened and thus shortened, redistributing loads to the exterior columns. Loads increased by up to 25% in some areas and decreased by up to 20% in other areas.

STEP 3: Dislodging of Fireproofing

The sprayed-on fireproofing was completely dislodged on all sides of some exterior columns, trusses, core beams, and all the gypsum board was knocked off some core columns over a wide area of multiple floors. According to NIST, the dislodging of fireproofing was necessary for the collapses to have occurred: "The

towers likely would not have collapsed under the combined effects of aircraft impact and the subsequent multi-floor fires... if the insulation had not been widely dislodged or had been only minimally dislodged by aircraft impact."

STEP 4: Sagging of Thermally Weakened Floors Pulled Exterior Columns Inward

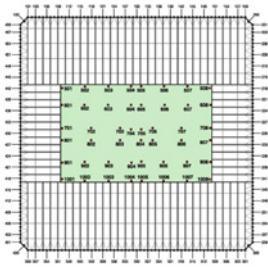
Heated floors began to sag and pull the exterior columns inward, though in some areas the floor connections failed rather than pulling on the exterior columns. In WTC 1, sagging of floors and inward bowing of exterior columns occurred on the south side from the 95th to the 99th floors. In WTC 2, sagging of floors and inward bowing of exterior columns occurred on the east side of the building from the 79th to the 83rd floors.

STEP 5: Exterior Columns Buckled, Causing Instability to Spread

The bowed exterior columns buckled. Their gravity loads were transferred to the adjacent exterior columns, but those columns quickly became overloaded as well. In WTC 1, the south wall failed. In WTC 2, the east wall failed.

STEP 6: Global Collapse Ensued

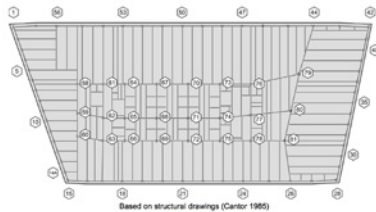
The portions of the buildings above where the failures occurred tilted in the direction of the failed walls, accompanied by a downward movement. The stories below the level of collapse initiation provided little resistance to the falling upper sections.



A floor plan of WTC 1. Rather than a conventional design where the support columns are arranged in a grid, the designers concentrated all of the columns at the center and the perimeter, creating a central core and an outer shell connected by horizontal floor trusses spanning from the center to the perimeter.



WTC 1 during construction.



A floor plan of WTC 7. According to NIST, Column 79 on the northeast side was the first column to fail.



A view of the 47-story WTC 7 from the viewing area of WTC 2.

WTC 7, Dr. Sunder said that NIST had some “preliminary hypotheses,” then added, “But truthfully, I don’t really know. We’ve had trouble getting a handle on building No. 7.” This was three and a half years into NIST’s WTC investigation.

That same month, NIST awarded a new contract to Applied Research Associates for the job of determining the location and cause of the initiating event and the subsequent series of failures that led to the total collapse of WTC 7. The contract was appended in August 2006 to include the task of determining if any “hypothetical blast event or events” contributed to the destruction of WTC 7. As we will see in Chapter 6, NIST would use the analysis performed under this contract in its attempt to disprove the hypothesis of controlled demolition.

In August 2008, the draft for public comment was finally released. That November, the final report was published. Diesel fuel fires and structural damage were no longer hypothesized to have contributed to the collapse. Instead, normal office fires were said to be the sole cause, making it “the first known instance of the total collapse of a tall building primarily due to fires.” ■

Table 3: Summary of NIST’s Probable Collapse Sequence for WTC 7

STEP 1: Debris from WTC 1 Ignited Fires

Falling debris from WTC 1, which collapsed at 10:28 AM, ignited fires on at least 10 different floors between Floors 7 and 30.

STEP 2: Fire Spread

Because water was not available in WTC 7, as a result of the water main being broken when WTC 1 collapsed, the automatic sprinkler system and the firefighters were unable to suppress the fires. Fires on Floors 7 to 9 and 11 to 13 spread over the course of several hours.

STEP 3: Thermal Expansion of Beams

The fires heated steel floor beams in affected areas to temperatures up to 700°C (1,292°F), causing them to thermally expand and damaging the floor framing on several floors.

STEP 4: Girder Walk-off

On the northeast corner of the building below the 13th floor, thermally expanding beams below Floor 13 pushed a critical girder (girder A2001) off of its seat at core corner Column 79. This thermal expansion occurred at temperatures at or below approximately 400°C (750°F), which is “hundreds of degrees below those typically considered in design practice for establishing structural fire resistance ratings.”

STEP 5: Cascade of Floor Failures

The unsupported girder, along with other local fire-induced damage, caused Floor 13 to collapse. This caused a cascade of floor failures down to Floor 5.

STEP 6A: Buckling of Column 79

Due to the cascade of floors, Column 79 was left laterally unsupported over nine floors, causing the column to buckle eastward between Floors 5 and 14. As Column 79 buckled, its upper section dropped, causing the kink and subsequent fall of the east penthouse observed in videos.

STEP 6B: Buckling of Columns 80 and 81

The cascading failures of the lower floors surrounding Column 79 led to increased unsupported length in Columns 80 and 81, as well as debris falling onto them and loads being redistributed to them, causing them to buckle.

STEP 7: Propagation of Internal Column and Floor Failures

All of the floor connections to Columns 79, 80, and 81 as well as the connections to the exterior columns failed, causing all the floors on the east side of the building to fall and leaving the exterior façade on the east quarter of WTC 7 a hollow shell. The interior column failures then progressed westward, with each north-south line of three core columns buckling in succession as a result of the loss of lateral support from floor system failures plus forces exerted by falling debris plus and the redistribution of loads from buckled columns. This sequence led to the drop of the screen wall and west penthouse.

STEP 8: Failure of the Exterior Columns

With loads redistributed to the exterior columns, the exterior columns buckled between Floors 7 and 14, causing the entire visible section of the building to drop uniformly as a unit, as observed in the videos.



3

The Destruction of WTC 1 and WTC 2

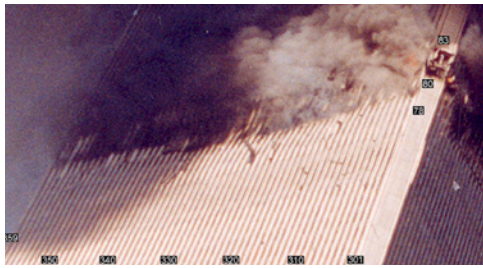
This chapter provides an overview of the evidence regarding the structural behavior of WTC 1 and WTC 2 during their destruction. The features of their behavior that will be examined include the onset of collapse, the downward acceleration of the upper sections, the manner in which the buildings' materials were destroyed, the high velocity bursts of debris ("demolition squibs") seen during collapse, and eyewitness accounts of the destruction.

In the last chapter, we examined the official investigations conducted by FEMA and NIST and found that instead of starting with the most likely hypothesis — which we have established as controlled demolition — investigators started with the hypothesis of fire-induced failure. They then clung to that hypothesis to the end, considering and rejecting various versions of it over several years, and, in the case of FEMA's WTC 7 investigation, acknowledging that their best hypothesis had only a low probability of occurrence.

We will now examine the evidence regarding the structural behavior of WTC 1 and WTC 2 during their destruction (WTC 7 will be covered in the next chapter) and evaluate whether it is more consistent with the

hypothesis of fire-induced failure advanced by NIST or with the hypothesis of controlled demolition. To guide our evaluation of these competing hypotheses, we now turn to a third principle that is fundamental to the scientific method. David Ray Griffin describes it as follows: "None of the relevant evidence should be ignored."¹ This principle is of central importance in evaluating the official hypothesis.

For, as we will see below, NIST ignored a large amount of the relevant evidence by stopping its analysis at the point of "collapse initiation." Instead of providing an explanation for what *actually* happened — the observed behavior of the buildings during their destruction — NIST limited the scope of its investigation



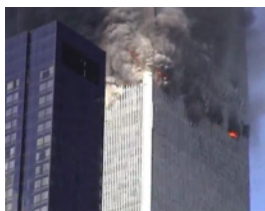
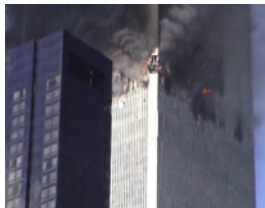
WTC 2 exterior columns bowing inward across the east face between Floors 77 and 83 at 9:58:55 a.m. (NIST NCSTAR 1-6, page 178, Figure 6-21).

to determining what *could* have happened to initiate the collapses. After that point, NIST asserted that global (total) collapse became inevitable. NIST clearly described its approach in a footnote on page 82 of its final report:

The focus of the Investigation was on the sequence of events from the instant of aircraft impact to the initiation of collapse for each tower. For brevity in this report, this sequence is referred to as the “probable collapse sequence,” although it includes little analysis of the structural behavior of the tower after the conditions for collapse initiation were reached and collapse became inevitable.

Sudden Onset

As discussed in Chapter 1, one of the features of controlled demolition is the sudden onset of collapse; whereas one of the features of fire-induced



Above left: *The initiation of collapse of WTC 2.*

Above right: *The initiation of collapse of WTC 1. These video frames show the collapse initiating at the 98th floor instead of at the 95th floor where the inward bowing of exterior columns was focused. The expulsion of smoke at the 98th floor is acknowledged by NIST on page 163 of NCSTAR 1-6.*

failure is that the onset of collapse is gradual, with randomly distributed, visible deformations appearing prior to the collapse. According to the authors of *Multi-Storey Buildings in Steel*, “A steel structure, generally speaking, does not collapse suddenly when attacked by fire. There are unmistakable warning signs, namely, large deformations.”²

By most accounts, the onset of collapse of WTC 1 and WTC 2 was sudden. As described by researchers Frank Legge and Anthony Szamboti in the paper ***9/11 and the Twin Towers: Sudden Collapse Initiation was Impossible***, “A slow, protracted, and sagging collapse was not observed.... As observed in the videos...the upper sections suddenly start to fall and disintegrate.”

NIST’s probable collapse sequence, however, portrays the onset as being *not* sudden in two ways:

1. NIST claimed that the bowing of exterior columns began several minutes before the collapses initiated.³ However, the observed bowing, which occurred only on a portion of one wall in each building, does not amount to the kind of “unmistakable warning signs” or “large deformations” that would be expected to precede fire-induced failure. If the inward bowing had been significant enough to affect the structure, it should have been much more pronounced, in which case NIST’s hypothesis of inward bowing exterior columns would have become a leading hypothesis much earlier than it did.
2. NIST then claimed that the bowing walls buckled and that instability subsequently spread to the rest of the exterior columns. Yet there is no visual evidence of either of these phenomena occurring prior to the onset of collapse. Readers are left to assume that this process was invisible and/or that it all happened in a single instant as part of the collapse initiation. According to Kevin Ryan, a former laboratory manager at Underwriters Laboratories, “instability spread would have taken much more time and would not result in uniform free fall [of the upper section onto the lower structure for a distance of up to one story].”⁴ In addition, prior to any movement in the area of the 95th floor, where inward bowing was focused, the videos of WTC 1 show the collapse initiating at the 98th floor, with a large amount of smoke being ejected on all sides of the building.

The gradual process and series of structural fail-

ures that NIST claims occurred are not apparent in the videos, which instead show the sudden fall and disintegration of the upper sections.

Constant Acceleration through the Path of Greatest Resistance

According to NIST, once collapse initiated, WTC 1 and WTC 2 fell in approximately 11 seconds and 9 seconds, respectively,⁵ each coming down “essentially in free fall.”⁶ To many observers, the speed of collapse was the most striking feature of their destruction.

Yet, NIST’s explanation for why WTC 1 and WTC 2 collapsed “essentially in free fall” was limited to a half-page section of its 10,000-page report titled “Events Following Collapse Initiation.” In this section, NIST attempted to explain the speed and completeness of the collapses simply by saying:

“It was not stopped by the floors below. So there was no calculation that we did to demonstrate what is clear from the videos.”

— NIST Investigator John Gross

The story immediately below the stories in which the columns failed was not able to arrest this initial movement as evidenced by videos from several vantage points.

The structure below the level of collapse initiation offered minimal resistance to the falling building mass at and above the impact zone. The potential energy released by the downward movement of the large building mass far exceeded the capacity of the intact structure below to absorb that through energy of deformation.

Since the stories below the level of collapse initiation provided little resistance to the tremendous energy released by the falling building mass, the building section above came

down essentially in free fall, as seen in videos.

However, NIST provided no calculations or modeling to support its claims. Instead it simply cited the videos as evidence. A **Request for Correction** to NIST’s report, filed under the Information Quality Act in 2007 by a group of scientists, an architect, and two 9/11 family members, argued that this was not scientifically valid:

*Here, NIST has not offered any explanation as to **why** (i.e. the technical cause of) the story below the collapse zone was not able to arrest the downward movement of the upper floors. The statement “as evidenced by the videos from several vantage points” is only an explanation of **what** occurred, but gives the reader absolutely no idea **why** it occurred. Basic principles of engineering (for example, the conservation of momentum principle) would dictate that the undamaged steel structure below the collapse zone would, at the very least, resist and slow the downward movement of the stories above.*

NIST’s use of the videos as evidence to explain why the lower structures failed to resist the fall of the upper sections was repeated by investigator John Gross in a talk he gave at the University of Texas in October 2006. In his talk, he actually refers to the video evidence as the reason why NIST did not need to perform analysis: “Once the collapse initiated, the video evidence is rather clear. It was not stopped by the floors below. So there was no calculation that we did to demonstrate what is clear from the videos.”⁷

But, as the **Request for Correction** pointed out, the inability of the lower structures to arrest the fall of the upper sections is what effectively claimed the lives of 421 first responders and 118 occupants at or below the impact zones,⁸ and thus it deserved thorough explanation:

*The families of the firefighters and WTC employees that were trapped in the stairwells when the entirety of the WTC Towers collapsed on top of them would surely appreciate an adequate explanation of **why** the lower structure failed to arrest or even resist the collapse of the upper floors.*

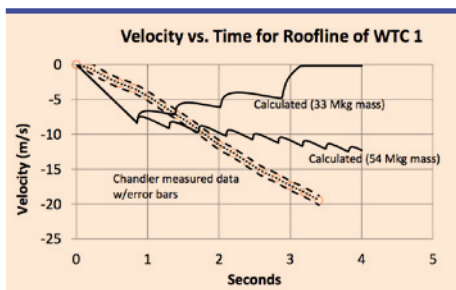
In its reply, NIST stated:

NIST carried its analysis to the point where

the buildings reached global instability. At this point, because of the magnitude of deflections and the number of failures occurring, the computer models are not able to converge on a solution.... [W]e were unable to provide a full explanation of the total collapse.

Providing a Full Explanation of the Total Collapse

While NIST acknowledges being “unable to provide a full explanation of the total collapse,” other researchers on both sides of the issue have analyzed the question extensively through methods other than computer modeling.



In this graph from Szamboti and Johns' Discussion paper, the observed velocity of the roofline of WTC 1 is compared with the velocity calculated using Bazant and Le's analytical method, but with corrected input values, showing significant decelerations at each floor.¹¹

percent of free fall,⁹ and there was never an observable deceleration, which would be required if the upper section had impacted and crushed the lower structure. A lack of deceleration would indicate with absolute certainty that the lower structure was

destroyed by another force before the upper section reached it.

In January 2011, the ASCE's *Journal of Engineering Mechanics* published a paper by Dr. Zdenek Bazant and Jia-Liang Le titled **Why the Observed Motion History of the World Trade Center Towers is Smooth**. This paper was a response to **The Missing Jolt: A Simple Refutation of the NIST-Bazant Collapse Hypothesis**, a paper critiquing Bazant's earlier work attempting to explain why the lower structures provided so little resistance to the upper sections. In the 2011 paper, Bazant and Le claimed that the deceleration of WTC 1's upper section was “far too small to be perceptible,” thus accounting for why the observed motion is “smooth.”

A number of papers supporting the hypothesis of controlled demolition have measured the fall of WTC 1's upper section and have observed that it never slowed down in the four seconds before it disappeared from view. Rather, its acceleration remained constant, at approximately 64

Anthony Szamboti, a mechanical engineer and one of the authors of “The Missing Jolt,” and Richard Johns, a professor of Philosophy of Science, submitted a Discussion paper in May 2011 arguing that Bazant and Le used incorrect values for the resistance of the columns, for the lower structure's floor mass, and for the upper section's total mass. By simply correcting the values, Szamboti and Johns argued that Bazant and Le's analysis actually proves that the deceleration of the upper section would be significant (if demolition were not involved), and that the collapse would arrest in about three seconds.¹⁰ While the *Journal of Engineering Mechanics* inexplicably rejected Szamboti and Johns' Discussion paper as “out of scope,” Szamboti, Johns, and Dr. Gregory Szuladzinski, a world-renowned expert in structural mechanics, were able to publish a paper addressing Bazant and Le's analysis in the *International Journal of Protective Structures*, titled **Some Misunderstand-**

The Journal of Engineering Mechanics' Rejection of the Szamboti-Johns Discussion Paper

Although it is customary for journals to publish Discussion papers about previously published papers, Szamboti and Johns' Discussion paper responding to Bazant and Le's “Why the Observed Motion History of the World Trade Center Towers Is Smooth” was never published by the *Journal of Engineering Mechanics*, despite passing peer review.

Szamboti and Johns submitted their Discussion paper in May 2011. After a year they were told that their paper had been rejected by one peer reviewer (the second reviewer did not respond). Szamboti and Johns found the reviewer's comments to be erroneous and submitted a rebuttal. The *Journal* then informed them that their paper had completed peer review and would only require editorial review.

Another year passed with no action. In May 2013, Szamboti and Johns contacted the *Journal's* editors. Three months later, the editors informed Szamboti and Johns that their Discussion paper was “out of scope” for the *Journal*.

Szamboti and Johns appealed the matter to the ASCE's Engineering Mechanics Institute Board of Governors, the body that oversees the *Journal of Engineering Mechanics*. Without finding errors in Szamboti and Johns' paper or explaining why it was appropriate to be deemed out of scope, the Board of Governors determined that Szamboti and Johns were treated fairly and stood by the *Journal's* decision to reject the paper.

Later, Roger Ghanem, the President of the Board of Governors, told Szamboti: “While your paper may very well be within the scope of the *Journal*, the Board's review of your case was concerned with whether or not the submission was treated fairly and in a manner that is consistent with the policies of the *Journal of Engineering Mechanics*.”

ings Related to the WTC Collapse Analysis.

Today, Bazant and Le's paper is the sole piece of analysis upon which the official hypothesis' explanation for the *total* collapse of WTC 1 and WTC 2 rests. By rejecting Szamboti and Johns' Discussion paper, the *Journal of Engineering Mechanics* has suppressed criticism of Bazant and Le's paper within its walls. But the papers discussed herein, published elsewhere, argue compellingly that the constant acceleration and lack of observable deceleration, by themselves, constitute irrefutable evidence that explosives were used to destroy WTC 1 and WTC 2.

Pulverization, Dismemberment, and Explosive Ejection of Materials

Because NIST stopped its analysis at the point of collapse initiation, it did not provide an explanation for the manner in which the buildings' materials were destroyed.

Pulverization and Dismemberment

One of the most noticeable features of the two buildings' destruction was the near-total pulverization of their concrete flooring. New York Governor George Pataki provided this account:

There's no concrete. There's very little concrete. All you see is aluminum and steel. The concrete was pulverized. And I was down here on Tuesday, and it was like you were on a foreign planet. All over lower Manhattan — not just this site — from river to river, there was dust, powder two, three inches thick. The concrete was just pulverized.¹²

In addition, the buildings' steel structures were almost entirely dismembered. Aside from some of the exterior walls at the base of each building still standing, virtually all of their steel skeletons were broken up into small pieces, with the core structures separated into individual members and the exterior columns broken up into three-story, prefabricated sections.

What can explain the near-total pulverization of approximately 8.8 million square feet of 5.5-inch-thick lightweight concrete flooring and the near-total



The pulverized concrete submerged lower Manhattan in enormous dust clouds and blanketed the streets with several inches of dust.



Debris from the dismembered structures of WTC 1 and WTC 2.

dismemberment of 220 stories of steel structure? NIST provides no explanation, and gravity alone appears to be implausible. A simple analysis of the approximate amount of energy required to pulverize the concrete and dismember the steel structures indicates that about 1,255 gigajoules of energy would have been required, far exceeding the estimated 508 gigajoules of gravitational potential energy contained in the buildings.¹³

The near-total pulverization and dismemberment of the structures becomes even more difficult to explain when we consider that the collapses occurred "essentially in free fall." Near-total pulverization and dismemberment would require a tremendous collision of materials at each floor, and yet NIST claims that the structure below "offered minimal resistance to the falling building mass." The official hypothesis thus attempts to have it both ways: "minimal resistance," "free fall," deceleration "far too small to be perceptible" — and yet near-total pulverization and dismemberment of the buildings' concrete and steel. But according to Dr. Steven Jones, a former physics professor at Brigham Young University, "The paradox is easily resolved by the explosive demolition hypothesis, whereby explosives quickly remove lower-floor material including steel support columns and allow near free-fall-speed collapses."¹⁴



The materials of WTC 1, including multi-ton beams, being explosively ejected several hundred feet in all directions.

Explosive Ejection of Materials

As the concrete was being pulverized and the structures were being dismembered, a large percentage of the buildings' materials was ejected upwards and laterally in an arc-like manner far beyond the perimeters of the buildings. According to the FEMA Building Performance Study, the debris fields extended as far as 400 to 500 feet from each tower's base.

In the popular five-minute video titled **North Tower Exploding**,

produced by physics teacher David Chandler, he describes the observed explosive ejection of materials from WTC 1:

[U]nder the canopy of falling debris, do you see the rapid sequence of explosive ejections of material? Some of the jets have been clocked at over 100 mph.... They're continuous and widespread. They move progressively down the faces of the building, keeping pace with the falling debris.... The building is being progressively destroyed from the top down by waves of explosions creating a huge debris field.

Chandler then describes the hurling of multi-ton steel members:

Notice that embedded in the dust clouds are huge girders and entire sections of steel framing that are being hurled out of the building.... Some landed as much as two football fields away from the base of the tower.

Chandler next addresses the claim that the ejection of these girders was caused by a spring action resulting from the upper sections crushing down upon them.

Some people have suggested that the weight of the tower crushing down on the girders caused them to flex and they sprung sideways by a

spring action. But we are not seeing isolated jumping girders. We are seeing a major fraction of the mass of the building...reduced to small pieces of rubble and fine dust, and being explosively ejected in all directions.

Demolition Squibs

Along with the pulverization, dismemberment, and explosive ejection of the buildings' materials, we observed what Kevin Ryan describes as "high velocity bursts of debris ejected from point-like sources."¹⁵ According to Ryan, "[T]he demolition hypothesis suggests that these bursts of debris are the result of the detonation of explosive charges (squibs), placed at key points in the structure to facilitate the removal of resistance." Ryan goes on to describe these apparent squibs in more detail:

In the videos we can see these bursts being ejected from the sides of the towers nearly 30 floors below the collapse front....

Each of these was a sharp emission that appeared to come from a point-like source, ejecting approximately 50 to 100 feet from the side of the building in a fraction of a second. From the extracted frames of the KTLA video,¹⁶ we can estimate that one of the bursts was fully ejected in approximately .45 seconds. This gives an average burst velocity of approximately 170 feet per second.

NIST's explanation for these high-velocity bursts of debris is provided *not* in its final report, but in its FAQs, where it calls them "puffs of smoke" and says, "[T]he falling mass of the building compressed the air ahead of it — much like the action of a piston — forcing smoke and debris out the windows as the stories below failed sequentially."

Kevin Ryan offers several arguments for why NIST's explanation is not valid:

- The floors were not the kind of tightly sealed, highly pressurized containers that would be required to generate overpressures strong enough to burst windows.
- The falling mass would need to act as a flat plate exerting uniform pressure at all points. But the falling upper sections, themselves disintegrating as observed in the videos,



High-velocity bursts of debris, or “squibs,” being ejected from point-like sources in WTC 1 and WTC 2, as many as 20 to 30 stories below the collapse front.

could not exert uniform pressure.

- Even if perfect containers and uniform pressure are assumed, using the Ideal Gas Law to calculate the change in pressure, we can determine that the air pressure would not increase enough to burst windows.

- The bursts contained pulverized debris, not smoke and dust. Yet building

materials 20 to 30 stories below the collapse zone could not be pulverized and ejected laterally by air pressure.

Eyewitness Accounts of Explosions

In addition to the wealth of video and photographic evidence regarding the destruction of WTC 1 and WTC 2, there is a wealth of eyewitness accounts. The largest source of eyewitness accounts is the New York Fire Department’s (FDNY’s) **World Trade Center Task Force Interviews**, which comprise approximately 10,000 to 12,000 pages of statements by over 500 FDNY personnel collected from early October 2001 to late January 2002.

NIST declares in its final report that it found “no corroborating evidence for alternative hypotheses suggesting that the WTC towers were brought down by controlled demolition using explosives planted prior to September 11, 2001.”¹⁷ Although it does not elaborate beyond that in its final report, one of the reasons NIST gives in its FAQs is as follows:

[T]here was no evidence (collected by NIST or by...the Fire Department of New York) of any blast or explosions in the region below the impact and fire floors as the top building sections began their downward movement upon collapse initiation.

This statement ignores and directly contradicts the plethora of accounts from eyewitnesses who report-

ed witnessing explosions, which they consciously identified as such.

The most comprehensive analysis of these accounts, performed by Dr. Graeme MacQueen, a retired professor of Religious Studies at McMaster University, and documented in Chapter 8 of **The 9/11 Toronto Report**, identifies 156 such eyewitnesses. The vast majority of them — 135, or 87 percent of the total — are first responders, including 121 from the FDNY and fourteen from the Port Authority Police Department. Thirteen are reporters, and the remaining eight MacQueen categorizes as “other,” usually people who worked near WTC 1 and WTC 2. **A selection of these accounts organized according to the characteristics discussed below (Identification, Power, and Pattern) is presented in Appendix A on page 44.**

MacQueen suggests that the main objection to interpreting these accounts as evidence of controlled demolition is that the observed explosions were some other natural form of explosion that occurs in large fires. However, MacQueen identifies three common characteristics among the accounts that distinguish the explosions in WTC 1 and WTC 2 from the four kinds of explosions that typically occur in fires (boiling-liquid-expanding-vapor-explosions or “BLEVEs”; electrical explosions; smoke explosions or “backdrafts”; and combustion explosions):

Identification: *If the explosions encountered were the type typically encountered in fires, the firefighters would be expected to recognize them as such and name them. There are very few instances where they do so. On the contrary, they clearly feel these were different types of explosions than those they were used to encountering...*

Power: *Many eyewitnesses clearly thought they were watching explosions destroy the Twin Towers. But none of the common four types of fire-related explosions could accomplish this...*

Pattern: *...[M]any eyewitnesses reported regular, rapid energetic events in sequence down the building, which cannot be explained by any of the four common types of explosion.*

The perception that explosions had destroyed WTC 1 and WTC 2 was so prevalent among firefighters that it became widely discussed. “At that point, a debate began to rage because the perception was that the building looked like it had been taken out with

Table 4: How Supporters of the Competing Hypotheses Have Accounted for Each Area of Evidence

	NIST: FIRE-INDUCED FAILURE	INDEPENDENT RESEARCHERS: CONTROLLED DEMOLITION
Sudden Onset	Ignore the suddenness and claim the occurrence of a series of structural failures for which there is no evidence.	Acknowledge and interpret as evidence of the sudden detonation of explosives.
Constant Acceleration	Stop analysis at the point of collapse initiation. Speculatively claim that the collapse became inevitable after conditions for collapse initiation were reached.	Acknowledge and interpret as evidence that explosives destroyed the lower structures before the upper sections reached them.
Pulverization, Dismemberment, and Explosive Ejection of Materials	Stop analysis at the point of collapse initiation. Do not acknowledge in final report or in FAQs.	Acknowledge and interpret as evidence that explosives pulverized, dismembered and explosively ejected the buildings' materials.
Demolition squibs	Stop analysis at the point of collapse initiation. Do not acknowledge in final report. Speculatively claim in FAQs that they are "puffs of smoke" caused by compressed air.	Acknowledge and interpret as evidence of explosives destroying the structure ahead of the collapse front.
Eyewitness Accounts of Explosions	Ignore in final report. In FAQs, deny existence of evidence of explosions collected by the FDNY. When formally challenged, claim that the eyewitness accounts "taken as whole" do not support the hypothesis of controlled demolition.	Acknowledge and interpret as testimonial evidence for the use of explosives.

charges," said Christopher Fenyo in his WTC Task Force Interview. John Coyle recalled in his interview, "I thought it was exploding, actually. That's what I thought for hours afterwards.... Everybody I think at that point still thought these things were blown up."³⁶

The **Request for Correction** filed with NIST in 2007 argued that NIST had, among other problems, ignored the eyewitness evidence of explosions contained in the **World Trade Center Task Force Interviews**. NIST responded by saying that it had reviewed them, and, "Taken as a whole, the interviews did not support the contention that explosives played a role in the collapse of the WTC Towers" — a markedly different position from the one given in its FAQs, which said that "There was **no evidence** (collected by...the Fire Department of New York) of any blast or explosions...."

In any case, MacQueen rejects NIST's assessment, writing in the paper **118 Witnesses: The Firefighters' Testimony to Explosions in the Twin Towers**:

We have 118 witnesses out of a pool of 503. Over 23 percent of our group are explosion witnesses. In my judgment, this is a very high percentage of witnesses, especially when we consider...[that Interviewees] were typically not asked about explosions, and, in most cases, were not even asked about the collapses of the towers. What testimony we have was vol-

unteered, and it therefore represents not the maximum number of witnesses to explosions but the minimum number.

Conclusion

In this chapter we examined five areas of evidence regarding the structural behavior of WTC 1 and WTC 2 during their destruction. Table 4 above presents each area of evidence and shows how researchers supporting each of the competing hypotheses have accounted for this evidence.

We found that NIST, because it decided to stop its analysis at the point of collapse initiation, performed "little analysis" of the buildings' structural behavior during the process of their destruction, thus deliberately ignoring any evidence that could be derived from it. As a result, NIST's final report provides virtually no explanation for the evidence examined above. The very limited explanations NIST does provide come mainly from its FAQs webpage, and are speculative rather than based upon scientific analysis. On the other hand, the hypothesis of controlled demolition readily, simply, and completely explains all of the evidence regarding the structural behavior of WTC 1 and WTC 2 during their destruction. ■



4 | The Destruction of WTC 7

This chapter provides an overview of the evidence regarding the structural behavior of WTC 7 during its destruction. The features that will be examined include WTC 7's free fall, its dismemberment and compact debris pile, and eyewitness accounts of its destruction. In addition, anticipation by local authorities of WTC 7's eventual collapse will be examined.

In the last chapter, we examined the evidence regarding the structural behavior of WTC 1 and WTC 2 during their destruction and found that the hypothesis of controlled demolition much more readily, simply, and completely explains the available evidence than does the hypothesis of fire-induced failure. This was illustrated in part by the fact that NIST ignored and provided virtually no explanation in its final report for the behavior of WTC 1 and WTC 2 after the point of collapse initiation.

We will now examine the evidence regarding the structural behavior of WTC 7 during its destruction and, in the same manner, evaluate whether it is more consistent with the hypothesis of fire-induced failure or the hypothesis of controlled demolition.

Whereas NIST's approach to WTC 1 and WTC 2 was to stop its analysis at the point of collapse initiation, NIST went beyond the point of collapse initiation with WTC 7. Yet, as we will see below, NIST still ignored a large amount of the relevant evidence, even going as far as attempting to deny the most important evidence: WTC 7's sudden and symmetrical free fall.

Sudden and Symmetrical Free Fall

Today, NIST acknowledges that WTC 7 fell at a rate of free fall (or the rate of gravity) for a period of approximately 2.25 seconds before it started to



WTC 7 is shown falling symmetrically into its own footprint. It accelerated at free fall for 2.25 seconds of its descent.

slow down.¹ David Chandler, a physics teacher who has studied the behavior of WTC 7 extensively, explains the significance of free fall in the article titled **Free Fall and Building 7 on 9/11**:

Newton's third law says that when objects interact, they always exert equal and opposite forces on each other. Therefore, while an object is falling, if it exerts any force on objects in its path, those objects must push back, slowing the fall. If an object is observed to be in free fall, we can conclude that nothing in the path exerts a force to slow it down....

Applying this to WTC 7, he explains:

[F]ree fall is not consistent with any natural scenario involving weakening, buckling, or crushing because in any such a scenario there would be large forces of interaction with the underlying structure that would have slowed the fall.... Natural collapse resulting in free fall is simply not plausible....

Chandler and others therefore interpret WTC 7's free fall as evidence of controlled demolition. How does NIST explain the occurrence of free fall according to its hypothesis of fire-induced failure? To answer that question satisfactorily, we must first examine NIST's initial attempt to deny the occurrence of free fall.

NIST's Denial of Free Fall

On August 21, 2008 — six years to the day after NIST's World Trade Center investigation was first announced — NIST released its draft report on WTC 7 for public comment. In it, NIST described the

collapse time of WTC 7 as being **40 percent longer than the time it would take to collapse in free fall**:

The time the roofline took to fall 18 stories was 5.4 s[econds].... Thus, the actual time for the upper 18 floors of the north face to collapse, based on video evidence, was approximately 40 percent longer than the computed free fall time....

NIST repeated this claim in its **Questions and Answers about the NIST WTC 7 Investigation** (WTC 7 FAQs), stating unequivocally, "WTC 7 did not enter free fall." NIST's lead investigator, Dr. Shyam Sunder, repeated it again at NIST's **WTC 7 Technical Briefing** on August 26, 2008, when asked the following question, which had been submitted by David Chandler:

Any number of competent measurements using a variety of methods indicate the northwest corner of WTC 7 fell with an acceleration within a few percent of the acceleration of gravity. Yet your report contradicts this, claiming 40 percent slower than free fall, based on a single data point. How can such a publicly visible, easily measurable quantity be set aside?

Dr. Sunder responded by articulating the meaning of free fall in the clearest terms possible, but denied that is what happened in the case of WTC 7:

[A] free-fall time would be an object that has no structural components below it.... What the analysis shows...is that same time it took for the structural model to come down...is 5.4 seconds. It's about 1.5 seconds, or roughly 40 percent, more time for that free fall to happen. And that is not at all unusual because there was structural resistance that was provided in this particular case.

NIST's Alleged 5.4-Second Collapse Time

The reason for the discrepancy between Chandler's measurement and NIST's measurement is contained in Dr. Sunder's statement above, where he explains that NIST's computer model showed a collapse time of 5.4 seconds. As Chandler comments in Part 1 of the video series **NIST Finally Admits Free Fall**:

Don't you find it interesting that the 5.4 seconds [NIST] measured for the collapse time just happens to exactly match the theoretical prediction of their model? That kind of precision is incredibly



Dr. Shyam Sunder explains the meaning of free fall at NIST's WTC 7 Technical Briefing on August 26, 2008.

rare when modeling real world events.

Indeed, when we count backwards 5.4 seconds from the point at which the roofline disappears from view, we find that there is no obvious, continuous movement of the building that could be reasonably interpreted as the start of the collapse. According to Chandler, "Since their model predicted 5.4 seconds for the 18-story collapse, they dutifully conjured up a 5.4-second measurement to match [the model]." Then, NIST assumed that the downward acceleration during those 5.4 seconds was "approximately constant"² — even though the building was almost entirely motionless for more than a second. Based upon this inaccurate characterization of WTC 7's motion, NIST denied the occurrence of free fall.

NIST's Acknowledgment of Free Fall

To the surprise of many observers, NIST reversed its position in its final report, acknowledging that WTC 7 did enter free fall for 2.25 seconds. But NIST still maintained the total collapse time of 5.4 seconds, which now comprised three separate stages:

- Stage 1 (0 to 1.75 seconds): acceleration less than that of gravity (i.e., slower than free fall)
- Stage 2 (1.75 to 4.0 seconds): gravitational acceleration (free fall)
- Stage 3 (4.0 to 5.4 seconds): decreased acceleration, again less than that of gravity³

However, in the first stage — which NIST characterizes as "a slow descent with acceleration less than that of gravity that corresponded with the buckling of the exterior columns at the lower floors" — the building is actually nearly motionless. By asserting a first stage in which we are to imagine "the buckling of exterior columns" causing "a slow descent," NIST is obscuring an important feature of WTC 7's free fall: its sudden onset. In Part 3 of the video series **NIST Finally Admits Free Fall**, Chandler observes:

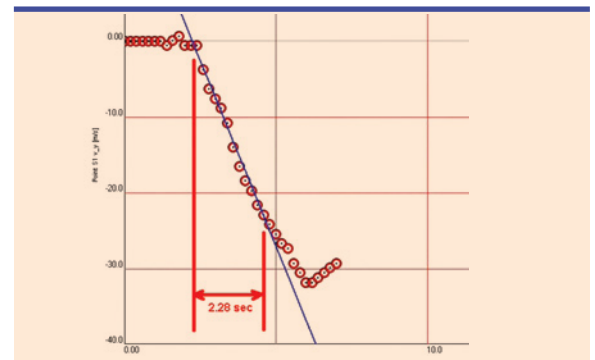
What is particularly striking is the suddenness of onset of free fall. Acceleration doesn't build up gradually. The graph [plotting the rate of acceleration] simply turns a corner. The building went from full support to zero support instantly...

Chandler then describes a second important feature of WTC 7's free fall:

The onset of free fall was not only sudden, it extended across the whole width of the building. My measurement of the acceleration was based on the northwest corner. NIST's recent measurement confirming free fall was based on a point midway along the roofline.

Taking the rate of acceleration, suddenness, and symmetry of WTC 7's descent into account, Chandler concludes:

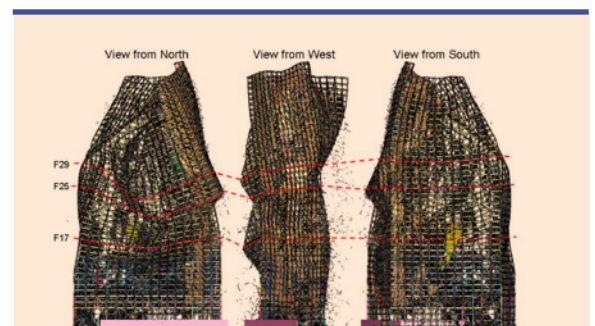
The collapse we see cannot be due to a column



David Chandler's graph from Part 3 of NIST Finally Admits Free Fall plots the velocity of WTC 7's roofline versus time. The slope shows a free-fall rate of acceleration. The sudden change in slope shows the sudden onset of free fall.

failure, or a few column failures, or a sequence of column failures. All 24 interior columns and 58 perimeter columns had to have been removed over the span of eight floors low in the building simultaneously to within a small fraction of a second, and in such a way that the top half of the building remains intact and uncrumpled.

While the hypothesis of controlled demolition



NIST's model of WTC 7's collapse shows large deformations to the exterior of WTC 7 not observed in the videos, while failing to show 2.25 seconds of free fall.



WTC 7's steel structure was dismembered and deposited into a compact debris pile.

explains WTC 7's free fall readily, simply, and completely, NIST's final report provided no explanation for how free fall was accomplished. It simply asserted, "The three stages of collapse progression described above are consistent with the results of the

global collapse analyses discussed in Chapter 12 of NIST NCSTAR 1-9," (the chapter that presents the results of NIST's "global model"). But that statement is incorrect. The free fall in Stage 2 is not shown in NIST's model. The failure of NIST's computer model to replicate the observed descent of WTC 7 will be examined more closely in Chapter 6.

Structural Dismemberment into a Compact Debris Pile

As with the destruction WTC 1 and WTC 2, the steel structure of WTC 7 was almost entirely dismembered, though, unlike the debris from WTC 1 and WTC 2, "The debris of WTC 7 was mostly contained within the original footprint of the building," according to NIST.

As discussed in Chapter 1, structural dismemberment is a key feature of controlled demolition. In a 1996 interview with NOVA, Stacey Loizeaux of Controlled Demolition, Inc. described the process that is used to dismember a building's structure and have it fall into its footprint:

Depending on the height of the structure, we'll work on a couple different floors — usually anywhere from two to six.... [W]e work on several upper floors to help fragment debris for the contractor, so all the debris ends up in small, manageable pieces.... The term "implosion"... [is] a more descriptive way to explain what we do than "explosion." There are a series of small explosions, but the building itself isn't erupting outward. It's actually being pulled in on top of itself. What we're really doing is removing specific support columns within the structure and then cajoling the building in one direction

or another, or straight down.

It is difficult to imagine an outcome that requires this high degree of planning and engineering being achieved by a spontaneous, fire-induced, gravity-driven collapse. Indeed, NIST's computer model terminates shortly after the initiation of collapse, and NIST does not attempt to explain the structural dismemberment and compact debris compile in any other section of its report.

Eyewitness Accounts of Explosions

NIST claims in its WTC 7 FAQs that "no blast sounds were heard on audio tracks of video recordings during the collapse of WTC 7 or reported by witnesses." However, both audio recordings and eyewitness accounts of explosions during the destruction of WTC 7 contradict NIST's claim.

Although there are not nearly as many eyewitness accounts of explosions in WTC 7 as in WTC 1 and WTC 2, there are a handful of accounts that strongly suggest explosions occurred immediately before and during WTC 7's destruction. These include:

- Craig Bartmer, former NYPD officer: *[A]ll of a sudden...I looked up, and... [t]he thing started peeling in on itself.... I started running...and the whole time you're hearing "thume, thume, thume, thume, thume." I think I know an explosion when I hear it.*⁴
- First-year NYU medical student identified as Darryl: *[W]e heard this sound that sounded like a clap of thunder.... [T]urned around — we were shocked.... [I]t looked like there was a shockwave ripping through the building and the windows all busted out.... [A]bout a second later the bottom floor caved out and the building followed after that.*⁵
- Kevin McPadden, unaffiliated, volunteer first responder: *And then it was like another two, three seconds, you heard explosions. Like BA-B00000M! And it's like a distinct sound...BA-B00000M! And you felt a rumble in the ground, like, almost like you wanted to grab onto something.*⁶



MSNBC reporter Ashleigh Banfield hears a loud sound from several blocks north of WTC 7 and says, "Oh my god.... This is it."

These eyewitness accounts are corroborated by MSNBC video footage of reporter Ashleigh Banfield several blocks north of WTC 7. In the video, she hears a loud sound, turns her attention to WTC 7, and says, "Oh my god.... This is it." About seven seconds after she hears the loud sound, WTC 7 collapses. As David Chandler observes in the video **Sound Evidence for Explosions:**

There were two blasts, followed by seven more regularly spaced all in two and a half seconds. Craig Bartmer's testimony may come to mind: "The whole time you're hearing 'thume, thume, thume, thume, thume.'"....

When we hear the sharp, regular series of sounds in the background, the building has not yet started to fall. When we hear the reporter say, "This is it," the building has not yet started to fall.... The blasts we heard occurred seconds before the building started to fall.

In addition to eyewitness accounts of explosions at the time of WTC 7's destruction, there were eyewitness accounts from two men — Michael Hess (Corporation Counsel for the City of New York) and Barry Jennings (Deputy Director of Emergency Services at the New York City Housing Authority) — who reported experiencing an explosion and smoke in a stairway in the northeast part of WTC 7 prior to the collapse of WTC 1 at 10:28 AM.⁷ It has been claimed that what Hess and Jennings experienced was the result of debris from WTC 1 impacting WTC 7. However, this claim is not plausible, as Hess and Jennings were in a stairway at the opposite end of WTC 7 (northeast) from where debris impacted the building (southwest), and their account indicates that the explosion and smoke they witnessed occurred before the collapse of WTC 1.⁸

Foreknowledge of WTC 7's Destruction

About an hour after the destruction of WTC 1 at 10:28 AM, the authorities at the World Trade Center began anticipating the collapse of WTC 7 with a high degree of confidence and precision. Their anticipation was so strong that the media widely reported on WTC 7's imminent collapse, with some news outlets even reporting the collapse before it occurred. **A**

selection of accounts showing this widespread anticipation is presented in Appendix B on page 46.

The official hypothesis would have us believe that the authorities' anticipation was "evidence-based," a prediction made on the basis of assessing the damage and fires in WTC 7. However, when examined closely, the high degree of confidence and precision suggests that it was instead knowledge-based. In other words, someone at the scene had foreknowledge that WTC 7 was going to be brought down and began warning others in order to avoid casualties and to create the cover story of a fire-induced failure. Thus, the warnings were couched as an evidence-based prediction that the building would collapse due to structural damage and fire.

The view that the anticipation was knowledge-based rather than evidence-based is strongly supported by the following facts:

- NIST's probable collapse sequence consists of an unprecedented and undetectable series of structural failures that could not be predicted on the basis of observing structural damage (which NIST later claimed did *not* contribute to the collapse) and fires. If we assume NIST's hypothesis to be true, there would be no reason to anticipate a total collapse, even within the seconds before it occurred. Based on NIST's scenario, the event that the authorities predicted had an infinitesimal probability of occurring until just seconds before it did. At that point, an extremely improbable chain of events unfolded and made their prediction correct. Such a scenario is not plausible.
- A number of buildings in the vicinity were on fire and sustained much greater damage from the destruction of WTC 1 and WTC 2. Yet authorities seized on WTC 7 as the one building that was certain to go down and established a safety zone around it.
- The FEMA Building Performance Study concluded that the best hypothesis it could come up with had "only a low probability of occurrence." **How were the authorities able to predict such a low-probability event?**
- Engineers were "stunned by what happened to 7 World Trade Center" and unable to explain it. Even as late as March 2006, NIST's

Table 5: How Researchers Have Accounted for the Evidence Regarding the Structural Behavior of WTC 7

	NIST: FIRE-INDUCED FAILURE	INDEPENDENT RESEARCHERS: CONTROLLED DEMOLITION
Sudden Symmetrical Free Fall	Attempt to deny the occurrence of free fall. Then acknowledge it but obscure its significance and provide no explanation.	Acknowledge and interpret as evidence that explosives were used to remove all of the columns simultaneously.
Structural Dismemberment into a Compact Debris Pile	Terminate computer model shortly after collapse initiation and provide no explanation for observed phenomena.	Acknowledge and interpret as evidence that explosives dismembered the structure and deposited it into a compact debris pile.
Eyewitness Accounts of Explosions	Deny the existence of audio recordings and eyewitness accounts of explosions.	Acknowledge and interpret as evidence of explosives.
Foreknowledge of Destruction	Provide a hypothesis that is incompatible with the high degree of confidence and precision with which the destruction of WTC 7 was anticipated.	Acknowledge and interpret as evidence of foreknowledge that WTC 7 was going to be brought down.



WTC 7 before and after its collapse. Based on NIST's probable collapse sequence, there would be no reason to predict a total collapse until seconds before it occurred.

Conclusion

In this chapter we examined three areas of evidence regarding the structural behavior of WTC 7 during its destruction, as well as the anticipation by local authorities of WTC 7's eventual collapse. Table 5 above presents each area of evidence and shows how researchers supporting the competing hypotheses have accounted for this evidence.

First, we found that NIST attempted to deny the most important evidence regarding WTC 7's destruction: its sudden and symmetrical free fall. NIST later acknowledged that WTC 7 entered free fall, but it obscured the significance of free fall and provided no explanation for how it was accomplished. We then saw that NIST provided no explanation for WTC 7's structural dismemberment and compact debris pile, and that it denied the existence of audio recordings and eyewitness accounts of explosions. Finally, we saw that NIST provided a hypothesis of fire-induced failure that is incompatible with the high degree of confidence and precision with which the destruction of WTC 7 was anticipated.

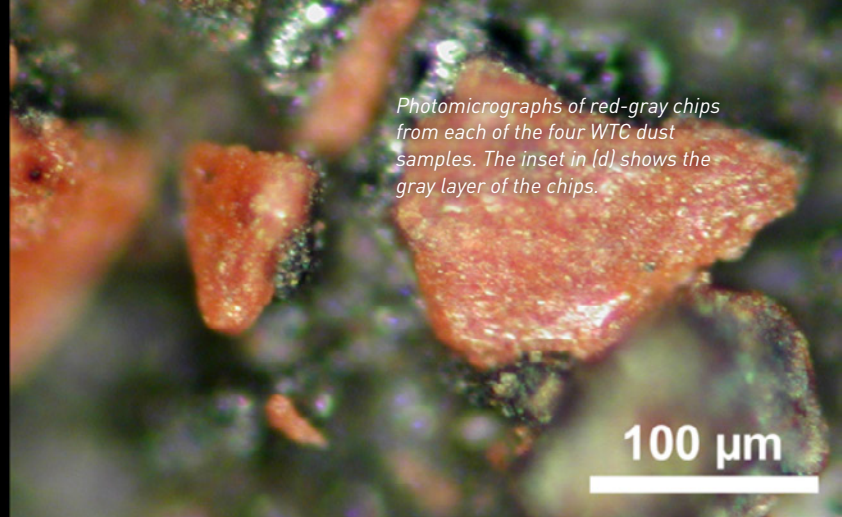
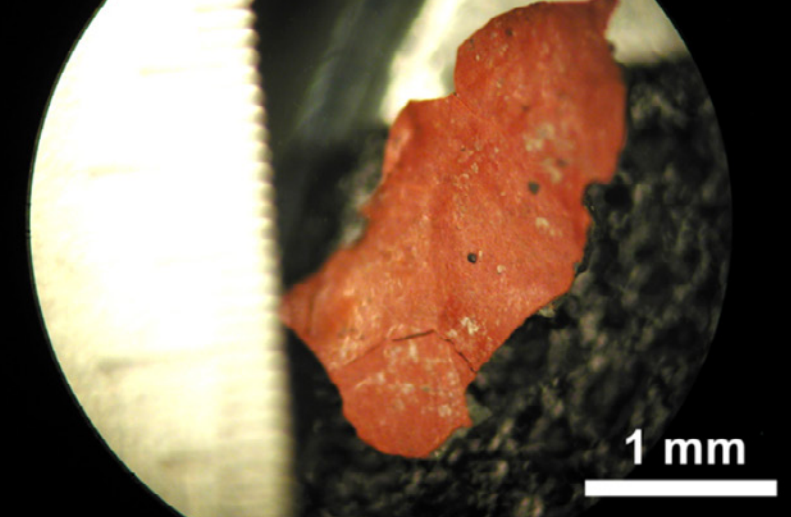
On the other hand — as with WTC 1 and WTC 2 — the hypothesis of controlled demolition readily, simply, and completely explains all of the evidence regarding the structural behavior of WTC 7 during its destruction. It also explains the high degree of confidence and precision with which WTC 7's destruction was anticipated. ■

lead investigator told *New York Magazine*, "I don't really know. We've had trouble getting a handle on building No. 7." **How were the authorities able to predict an event that engineers would be unable to explain even four and half years later?**

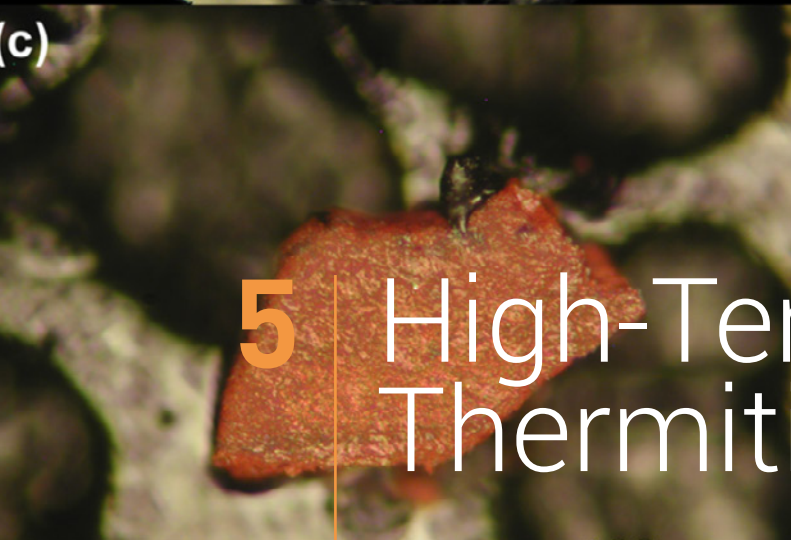
- A CNN video captured both the sound of an explosion coming from WTC 7 and an emergency worker's warning that WTC 7 was "about to blow up" just seconds before its destruction:

[Sound of explosion]. Unidentified voice: "You hear that?" Voice of emergency worker #1: "Keep your eye on that building, it'll be coming down...." Voice of emergency worker #2: "Building is about to blow up, move it back.... Here we are looking back, there's a building about to blow up. Flame and debris coming down."

- There are at least four accounts showing that a controlled demolition was being considered or planned. **(See Appendix B on page 46.)**



Photomicrographs of red-gray chips from each of the four WTC dust samples. The inset in [d] shows the gray layer of the chips.



5 | High-Temperature Thermite Reactions

This chapter provides an overview of evidence showing the occurrence of high-temperature thermite reactions in the destruction of WTC 1, WTC 2, and WTC 7. The evidence that will be examined includes molten metal seen pouring out of WTC 2, molten metal in the debris of all three buildings, sulfidated steel in WTC 7, and iron spherules and nano-thermite in the World Trade Center dust.

In the last two chapters, we examined the evidence regarding the structural behavior of WTC 1, WTC 2, and WTC 7 during their destruction. We will now turn to evidence showing the occurrence of high-temperature chemical reactions before and during the destruction of the buildings. As in previous chapters, we will evaluate whether this evidence is more consistent with the hypothesis of fire-induced failure or the hypothesis of controlled demolition.

To guide our evaluation of the competing hypotheses, we will apply the third principle discussed earlier — “None of the relevant evidence should be ignored” — to the investigation of high-temperature chemical reactions. “Chapter 23: Explosions” of **NFPA 921**, which is the national guideline for fire

and explosion investigations, states: “All available fuel sources should be considered and eliminated until one fuel can be identified as meeting all the physical damage criteria as well as any other significant data.” On the potential use of exotic accelerants, including thermite, **NFPA 921** advises: “Indicators of exotic accelerants include...melted steel or concrete.”

As we will see below, NIST did not follow **NFPA 921**. Instead, it handled the evidence of high-temperature chemical reactions in much the same way it handled the evidence regarding the structural behavior of the buildings: either denying it, ignoring it, or providing speculative explanations not based upon scientific analysis. This is because there is no plausible, logical



A thermite reaction.



Molten aluminum.

KEY TERMS

Thermite: A mixture of powdered aluminum and iron oxide (rust). When ignited, the aluminum reduces the iron oxide to molten iron at 2,500°C (4,500°F). It is typically used for welding railroad ties and in grenades. It is not typically used in controlled demolitions.

Nano-thermite: Thermite made of nano-particles (~four billionths of an inch). Its increased surface area causes it to burn much faster than conventional thermite.

explanation for the occurrence of high-temperature chemical reactions other than controlled demolition using thermite-based mechanisms.

Molten Metal Pouring out of WTC 2

Just before 9:52 AM, molten metal began pouring out of WTC 2 near the northeast corner of the 80th floor and continued to flow with increasing intensity until the collapse at 9:59 AM. NIST provided ample documentation of the pouring molten metal, which it described and hypothesized as follows:

Just over a second [after 9:51:51 AM], a bright spot appeared at the top of one window...and a glowing liquid began to pour from this location....

The composition of the flowing material can only be the subject of speculation, but its behavior suggests it could have been molten aluminum.... The Aluminum Association Handbook...lists the melting point ranges for the alloys [comprising the Boeing 767 structure] as roughly 500°C to 638°C and 475°C to 635°C.... These temperatures are well below those characteristic of fully developed fires (c. 1,000°C)....¹

But, as Dr. Steven Jones writes in ***Why Indeed Did the WTC Buildings Completely Collapse***, this claim is untenable due to the color of the molten metal:

Is the falling molten metal from WTC Tower 2...more

likely molten iron from a thermite reaction OR pouring molten aluminum?

The yellow color implies a molten metal temperature of approximately 1,000°C, evidently above that which the dark-smoke hydrocarbon fires in the Towers could produce.... Also, the fact that the liquid metal retains an orange hue as it nears the ground...further rules out aluminum....

We also noted [in our experiments] that...the falling aluminum displayed a silvery-gray color, adding significantly to the evidence that the yellow-white molten metal flowing out from the South Tower shortly before its collapse was NOT molten aluminum.

In its FAQs posted in August 2006, almost a year after the release of its final report, NIST attempted to address the criticism that molten aluminum would have a silvery appearance:

Pure liquid aluminum would be expected to appear silvery. However, the molten metal was very likely mixed with large amounts of hot, partially burned, solid organic materials... which can display an orange glow, much like logs burning in a fireplace.

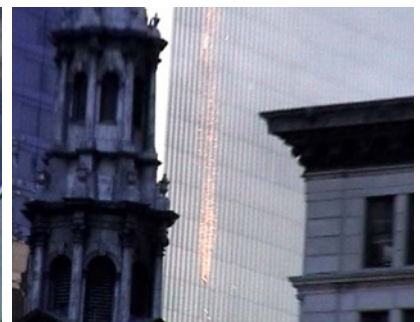
While NIST did not test its hypothesis — merely asserting that it was “very likely” — Dr. Jones did:

NIST states the hypothesis that flowing aluminum with partially burned organic materials mixed in, “can display an orange glow.” But will it really do this? I decided to do an experiment to find out.... Of course, we saw a few burning embers, but this did not alter the silvery appearance of the flowing, falling aluminum....

In the videos of the molten metal falling from



Molten metal pouring out of WTC 2.



WTC 2 just prior to its collapse, the falling liquid appears consistently orange, not just orange in spots and certainly not silvery. We conclude from all of these studies that the falling metal which poured out of WTC 2 is NOT aluminum.

Nine years later, NIST still has not conducted its own experiments to verify its hypothesis, nor has it revised its FAQs to account for the results of Dr. Jones' experiments.

Molten Metal in the Debris

Not only was molten metal seen pouring out of WTC 2, dozens of eyewitnesses observed it in the debris of all three buildings. A small selection is presented below:

- Leslie Robertson, a lead engineer in the design of WTC 1 and WTC 2, told an audience: "We were down at the B-1 level and one of the firefighters said, 'I think you'd be interested in this.' And they pulled up a big block of concrete, and there was like **a little river of steel flowing**."²
- FDNY Captain Philip Ruvolo recalled with other firefighters seated next to him: "You'd get down below and **you'd see molten steel, molten steel, running down the channel rails, like you're in a foundry, like lava.**" Other firefighters chimed in: "**Like lava.**" "**Like lava from a volcano.**"³



This photograph, taken by Frank Silecchia on September 27, 2001, shows a piece of metal being dug up that is salmon-to-yellow color, indicating temperatures from 845°C (1,550°F) to 1,040°C (1,900°F).

- Ken Holden, the Commissioner of the NYC Department of Design and Construction, testified before the 9/11 Commission: "Underground it was still so hot that **molten metal dripped down the sides of the wall** from Building 6."⁴

According to NIST, the highest temperature reached by the fires was 1,100°C. Yet structural steel does not begin to melt until about 1,482°C (2,700°F). How then did NIST explain the evidence of molten metal?

NIST's first approach was to omit the evidence of molten metal from its final report. Then, in its August 2006 FAQs, it addressed that evidence with the following question and answer.

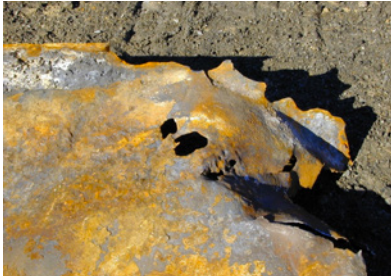
13. Why did the NIST investigation not consider reports of molten steel in the wreckage from the WTC towers?

NIST investigators...found no evidence that would support the melting of steel in a jet-fuel ignited fire in the towers prior to collapse. The condition of the steel in the wreckage of the WTC towers (i.e., whether it was in a molten state or not) was irrelevant to the investigation of the collapse since it does not provide any conclusive information on the condition of the steel when the WTC towers were standing....

Under certain circumstances it is conceivable for some of the steel in the wreckage to have melted after the buildings collapsed. Any molten steel in the wreckage was more likely due to the high temperature resulting from long exposure to combustion within the pile than to short exposure to fires or explosions while the buildings were standing.

Each claim in NIST's answer is demonstrably unscientific:

- In the first sentence, NIST assumes that the only possible cause of "melting steel" would have been "the jet-fuel ignited fire in the towers," which is an implausible hypothesis on its face.
- NIST's next claim — "*The condition of the steel in the wreckage...was irrelevant to the investigation...since it does not provide any conclusive information on the condition of the steel when the WTC towers were standing*" — flies in the face of forensic investigation principles. Recall **NFPA 921**, which explicitly advises, "Indicators of exotic accelerants include...melted steel or concrete." Furthermore, in science, evidence is not ignored on the basis that it is not conclusive by itself. NIST's claim is yet more problematic because molten metal was observed pouring out of WTC 2 — "when the WTC towers were standing" — as NIST documented extensively.



The eroded, sulfidated steel from WTC 7 at the scrapyard before it was cut off and taken for testing.



John Gross, who represented NIST on the FEMA Building Performance Study, poses next to the eroded, sulfidated steel. NIST would later claim that no identifiable steel was recovered from WTC 7, and John Gross would deny the existence of molten metal.

■ NIST's next claim is simply false. It is impossible for a diffuse hydrocarbon fire to reach temperatures close to the 1,482°C (2,700°F) required to melt steel, particularly in an oxygen-starved debris pile.

■ Finally, with the expression "Any molten metal in the wreckage," NIST neither confirmed nor denied the existence of molten metal. In an investigation that followed **NFPA 921**, NIST would have sought to establish whether molten metal was present and, if so, what its source was.

However, outright denial would be the approach used by NIST investigator John Gross. In a talk at the University of Texas in October 2006, he responded to a question about the presence of molten metal with the following answer:

First of all, let's go back to your basic premise that there was a pool of molten steel. I know of absolutely nobody, no eyewitness who has said so, nobody who's produced it. I was on the site. I was on the steel yards. So I don't know that that's so. Steel melts at around 2,600°F. I think it's probably pretty difficult to get that kind of temperatures in a fire.⁵

Sulfidated Steel in WTC 7

In a *New York Times* article published in February 2002, James Glanz and Eric Lipton wrote:

Perhaps the deepest mystery uncovered in the investigation involves extremely thin bits of steel collected...from 7 World Trade Center.... The steel apparently melted away, but no fire in any of the buildings was believed to be hot enough to melt steel outright.... A preliminary analysis at Worcester Polytechnic Institute [WPI]...suggests that sulfur released during

the fires—no one knows from where—may have combined with atoms in the steel to form compounds that melt at lower temperatures.⁶

The WPI professors, who were "shocked" by the "Swiss cheese appearance" of the steel, reported their analysis in Appendix C of the FEMA Building Performance Study, making the following recommendation:

The severe corrosion and subsequent erosion of Samples 1 and 2 are a very unusual event. No clear explanation for the source of the sulfur has been identified.... A detailed study into the mechanisms of this phenomenon is needed...."

A simple explanation for the source of sulfur, as well as the high-temperature corrosion and erosion, is "thermate," which is produced when sulfur is added to thermitite. In **Revisiting 9/11—Applying the Scientific Method**, Dr. Steven Jones explains:

When you put sulfur into thermitite it makes the steel melt at a much lower temperature, so instead of melting at about 1,538°C it melts at approximately 988°C, and you get sulfidation and oxidation in the attacked steel....

The thermitite reaction proceeds rapidly and is in general faster than basic thermitite in cutting through steel due to the presence of sulfur.

How did NIST respond to FEMA's recommendation?

First, NIST ignored it — thus ignoring what the *New York Times* called "perhaps the deepest mystery uncovered in the investigation."

Second, NIST claimed that no identifiable steel was recovered from WTC 7, providing the following answer in its WTC 7 FAQs:

Once [debris] was removed from the scene, the steel from WTC 7 could not be clearly identified. Unlike pieces of steel from WTC 1 and WTC 2, which were painted red and contained distinguishing markings, WTC 7 steel did not contain such identifying characteristics.

Third, when asked at NIST's **WTC 7 Technical Briefing** on August 26, 2008, whether NIST had tested "any WTC 7 debris for explosive or incendiary chemical residues," NIST lead investigator Dr. Shyam Sunder replied:

[T]here is reference often made to a piece of steel from Building 7.... But that piece of steel has been subsequently analyzed by Professor Barnett and by Professor Rick Sisson, who is also from [WPI]...and they reported in a BBC interview that aired on July 6 [2008] that there was no evidence that any residue in that...piece of steel had any relationship to an...incendiary device in the building.

Besides contradicting NIST's position that no identifiable steel was recovered from WTC 7, Dr. Sunder's response raises the question: Why did NIST not ask to study that piece of steel if they knew it existed? Furthermore, why did NIST not perform experiments to verify the leading fire-based explanation for the source of sulfur, which was the buildings' gypsum wallboard?

Though NIST was not up to the task, a civil engineer named Jonathan Cole was. In his experiment documented in the video **9/11 Experiments: The Mysterious Eutectic Steel**, he used a wide flange beam packed with crushed gypsum board, crushed concrete, aluminum scraps, steel scraps, and diesel fuel, and he burned it for 24 hours, continually adding fuel such as brush, furniture, floor panels, and wood logs. At the end of his experiment he reported:

The aluminum, concrete, drywall, diesel fuel, and building materials did not cause any intergranular melting. So, if [these materials] did not cause the intergranular melting and sulfidation, then some uncommon substance that is not normally found in buildings must have caused it....

There is a reason why NIST...never conducted any experiments or found that source of sulfur in order to solve this deepest of mysteries. Perhaps NIST knew the most logical cause of the sulfidation of the steel is from some type of thermitic reaction....

Iron Spherules and Other Particles in the WTC Dust

Three scientific studies have documented evidence in the WTC dust that indicates extremely high tem-

peratures during the destruction of WTC 1 and WTC 2 — and possibly WTC 7.

The RJ Lee Report

Released in May 2004, the RJ Lee report titled **WTC Dust Signature** identified “[s]pherical iron and spherical or vesicular silicate particles that result from exposure to high temperature” in the dust.

An earlier 2003 version of RJ Lee's report observed:

Various metals (most notably iron and lead) were melted during the WTC event, producing spherical metallic particles. Exposure of phases to high heat results in the formation of spherical particles due to surface tension.... Particles of materials that had been modified by exposure to high temperature, such as spherical particles of iron and silicates, are common in the WTC dust...but are not common in normal office dust.

The 2003 version also reported that while iron particles make up only 0.04 percent of normal building dust, they constituted 5.87 percent of the WTC dust.

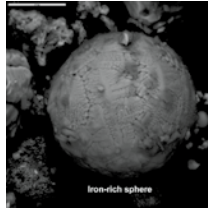
Iron does not melt until 1,538°C (2,800°F), which, as discussed above, cannot be reached by diffuse hydrocarbon fires. Still, even higher temperatures than 1,538°C were indicated by another discovery documented in RJ Lee's report:

The presence of lead oxide on the surface of mineral wool indicates the existence of extremely high temperatures during the collapse which caused metallic lead to volatilize, oxidize, and finally condense on the surface of the mineral wool.

The 2003 version also referred to temperatures “at which lead would have undergone vaporization.” For such vaporization to occur, lead would need to have been heated to its boiling point of 1,749°C (3,180°F).

The USGS Report

Released in 2005, a report by the U.S. Geological Survey (USGS) titled **Particle Atlas of World Trade Center Dust** identified “trace to minor amounts” of “metal or metal oxides” in the WTC dust and presented micrographs of these particles, two of which were labeled “Iron-rich sphere.”



A scanning electron microscopy image with EDS of an “iron-rich sphere” provided by USGS.

Steven Jones et al.

Published by Dr. Steven Jones and seven other scientists in early 2008, the paper **Extremely High Temperatures during the World Trade Center Destruction** connected the dots between the earlier RJ Lee and

Table 6: Approximate Minimum Temperatures Required

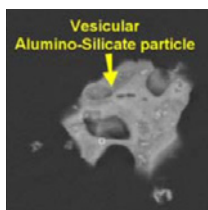
PROCESS AND MATERIAL	°C	°F
To form Fe-O-S eutectic (with ~50 Mol % sulfur) in steel	1,000	1,832
To melt aluminosilicates (spherule formation)	1,450	2,652
To melt iron (spherule formation)	1,538	2,800
To melt iron (III) oxide (spherule formation)	1,565	2,849
To vaporize lead	1,740	3,164
To melt molybdenum (spherule formation)	2,623	4,753
To vaporize aluminosilicates	2,760	5,000

Reproduced from the paper **Extremely High Temperatures during the WTC Destruction**.

USGS reports. It also provided new observations based on analysis of WTC dust samples obtained by Dr. Jones. According to the authors:

The formation of spherules in the dust implies the generation of materials somehow sprayed into the air so that surface tension draws the molten droplets into near-spherical shapes. The shape is retained as the droplet solidifies in the air.

In addition to observing spherules of iron and silicates, their study discussed the presence of molybdenum spherules documented by the USGS study but not included in its report. (This additional data from the USGS study was obtained through a FOIA request.) Molybdenum is known for its extremely high melting point of 2,623°C (4,754°F).



A scanning electron microscopy image with EDS of vesicular alumino-silicate provided by RJ Lee.

Jones’ study also discussed evidence of even higher

temperatures contained in the RJ Lee report (quoting from the RJ Lee report):

Some particles show evidence of being exposed to a conflagration such as spherical metals and silicates, and vesicular particles (round open porous structure having a Swiss cheese appearance as a result of boiling and evaporation)... These transformed materials include: spherical iron particles, spherical and vesicular silicates, and vesicular carbonaceous particles.

Dr. Jones and his coauthors observed:

[I]f the “Swiss-cheese appearance” is indeed the result of “boiling and evaporation” of the material as the [RJ Lee] report suggests, we note the boiling temperature for aluminosilicate is approximately 2,760°C.

They then provided a table (see Table 6 at left) summarizing the temperatures needed to account for the various evidence of high temperatures in the World Trade Center destruction, which they contrasted with the much lower maximum temperatures associated with the fires on September 11.

The closest NIST has come to acknowledging the evidence of extremely high temperatures in the WTC dust was in an email communication with an independent researcher following the release of NIST’s draft report on WTC 7. NIST replied to the researcher’s inquiry with a single sentence: “The NIST investigative team has not seen a coherent and credible hypothesis for how iron-rich spheres could be related to the collapse of WTC 7.”⁸

Nano-thermite in the WTC Dust

In April 2009 a group of scientists led by Dr. Niels Harrit, an expert in nano-chemistry who taught chemistry at the University of Copenhagen for over 40 years, published a paper in the *Open Chemical Physics Journal* titled **Active Thermite Materials Discovered in Dust from the 9/11 World Trade Center Catastrophe**. This paper, which reported the results of experiments conducted on small red-gray, bi-layered chips found in multiple independent WTC dust samples, concluded that the chips were unreacted nano-thermite, a form of thermite with explosive properties engineered at the nano-level.

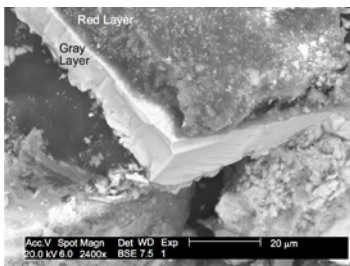
According to their analyses, the gray sides of the chips consisted of “high iron and oxygen content including a smaller amount of carbon,” while the red sides had various features indicative of thermite and nano-thermite.

Features Indicative of Thermite

- The chips were composed primarily of “aluminum, iron, oxygen, silicon, and carbon.” The first three elements are suggestive of thermite, which is commonly made by combining aluminum and iron oxide.
- Their red color and magnetic properties were suggestive of iron.
- They all ignited between 415° and 435°C, producing highly energetic reactions.

Features Indicative of Nano-thermite

- The chips’ primary ingredients were ultra-fine grain, seen typically “in particles at the scale of tens to hundreds of nanometers.”
- The ultra-fine ingredients were intimately mixed.
- When a flame was applied to them, it resulted in a “high-speed ejection of a hot particle.”



A backscattered electron image of a red-gray chip.

- They ignited at a much lower temperature — 430°C — than the temperature at which conventional thermite ignites, which is above 900°C.

- Silicon was one of their main ingredients, and it was porous, suggesting the thermite material was mixed in a sol-gel to form a porous reactive material.

- Their carbon content was significant. The authors noted that this “would be expected for super-thermite formulations in order to produce high gas pressures upon ignition and thus make them explosive.”

The presence of the above-described substance in the WTC dust strongly suggests that nano-thermite was used in the destruction of WTC 1, WTC 2, and WTC 7.

What other explanations for this substance exist?

The first possibility is that the red-gray chips were in fact paint chips. The researchers explored this possibility — first by soaking the chips in methyl ethyl ketone (a solvent known to dissolve paint chips, which did not succeed in dissolving the red-gray chips), and second by exposing the red-gray chips and known paint chips to a hot flame. The paint chips dissolved into ash, while the red-gray chips did not.

The second possibility is that the WTC dust might somehow have been contaminated with the red-gray chips during the cleanup operation. However, this hypothesis was ruled out on the basis that all four of the dust samples had been collected at times or places that precluded any contamination. One sample was collected about 20 minutes after the collapse of WTC 1. Of the other three samples, two were collected the next day.

With those two possibilities ruled out, no other plausible explanation has been provided — nor has NIST responded to the reported discovery of nano-thermite in the WTC dust.

Therefore, the presence of unreacted nano-thermite in the WTC dust — which is corroborated by other evidence of high-temperature chemical reactions — constitutes compelling evidence that WTC 1, WTC 2, and WTC 7 were destroyed by controlled demolition using nano-thermite and possibly other explosive and incendiary materials.

NIST’s Refusal to Test for Explosives or Thermite Residues

Despite the compelling evidence for high-temperature thermite reactions examined above, NIST has refused to test for explosives or thermite residues. NIST provides the following question and answer in its FAQs on WTC 1 and WTC 2:

Was the steel tested for explosives or thermite residues?

NIST did not test for residues of these compounds in the steel.... Analysis of the WTC steel for the elements in thermite/thermate would not necessarily have been conclusive. The metal

Table 7: How Researchers Have Accounted for the Evidence Showing the Occurrence of High-Temperature Chemical Reactions

	NIST: FIRE-INDUCED FAILURE	INDEPENDENT RESEARCHERS: CONTROLLED DEMOLITION
Molten Metal Pouring out of WTC 2	Document extensively. Without performing experiments, claim that it was molten aluminum from the airplane mixed with organic materials.	Acknowledge and interpret as evidence of a thermite reaction. Conduct experiments that rule out NIST's explanation.
Molten Metal in the Debris	Neither confirm nor deny. Speculatively and erroneously suggest that steel could have melted in the rubble.	Acknowledge and interpret as evidence of thermite reactions.
Sulfidated Steel in WTC 7	Ignore FEMA's recommendation for further study.	Acknowledge and interpret as evidence of thermite reactions.
Iron Spherules and Other Particles in the WTC Dust	Ignore completely.	Acknowledge and interpret as evidence of extremely high temperatures caused by thermite reactions.
Nano-thermite in the WTC Dust	Ignore completely.	Acknowledge and interpret as evidence of the use of nano-thermite in the destruction of WTC 1, WTC 2, and WTC 7.

compounds also would have been present in the construction materials making up the WTC towers, and sulfur is present in the gypsum wall-board that was prevalent in the interior partitions.

But, to reiterate the point mentioned above, evidence is not ignored in science just because it is not conclusive. In fact, NIST conducted many tests during the course of its investigation that were not conclusive (see Chapter 6). Given the evidence examined in this chapter, some of which had already been discussed widely during NIST's investigation, NIST had every reason to conduct very simple lab tests for explosives and thermite residues, regardless of whether or not such testing would have been conclusive.

Moreover, NIST's answer actually implies that such testing might have been conclusive. Indeed, a negative result would certainly be conclusive. A positive result could also have been conclusive. This argument was made in the **Appeal** of NIST's response to the **Request for Correction** filed in 2007, which quoted the following statement from Materials Engineering, Inc.:

*When thermite reaction compounds are used to ignite a fire, they produce a characteristic burn pattern, and leave behind evidence. The compounds are rather unique in their chemical composition.... While some of these elements are consumed in the fire, many are also left behind in the residue.... **The results [of Energy Dispersive Spectroscopy on minute traces of residue], coupled with visual evidence at the scene, provide absolute certainty that thermite reaction compounds were present....***

The **Appeal** therefore argued:

[I]t is difficult to imagine a scenario in which a test for explosive residues would not be conclusive.... Unless NIST can explain a plausible scenario that would produce inconclusive explosive residue test results, its stated reason for not conducting such tests is wholly unpersuasive.


NIST ignored this point in its response to the **Appeal** and provided no such scenario.

Conclusion

In this chapter we examined five areas of evidence showing the occurrence of high-temperature thermite reactions in the destruction of WTC 1, WTC 2, and WTC 7. Table 7 above presents each area of evidence and shows how researchers who support the competing hypotheses have accounted for this evidence.

We found that NIST provided woefully inadequate and erroneous explanations for the molten metal seen pouring out of WTC 2 and in the debris of all three buildings. Furthermore, NIST provided no explanation for the sulfidation of steel in WTC 7 and no explanation for evidence of extremely high temperatures in the WTC dust, except to deny that a coherent and credible hypothesis to explain it existed. Finally, NIST has not commented on the discovery of unreacted nano-thermite in the WTC dust.

On the other hand — as with the structural behavior of WTC 1, WTC 2, and WTC 7 — the hypothesis of controlled demolition readily, simply, and completely explains all of the evidence showing the occurrence of high-temperature thermite reactions. ■



NIST investigator John Gross poses next to a piece of eroded, sulfidated steel from WTC 7 in October 2001.

6 NIST's Evidence for Fire-Induced Failure

This chapter provides an overview of the analyses that NIST performed to support its hypothesis of fire-induced failure. The areas that will be examined include NIST's analysis of "hypothetical blast scenarios" in WTC 7 and the possible use of thermite, NIST's estimates of fireproofing dislodgement in WTC 1 and WTC 2, NIST's testing of the steel temperatures, and NIST's computer modeling.

In the last three chapters, we examined the evidence regarding the structural behavior of WTC 1, WTC 2, and WTC 7 during their destruction, as well as evidence showing the occurrence of high-temperature thermitic reactions. We found consistently that NIST either denied the evidence, ignored it, or provided speculative explanations not based upon scientific analysis. By contrast, the hypothesis of controlled demolition readily, simply, and completely explained all of the evidence examined.

In this final chapter, we will turn to evaluating the analyses that NIST performed to support its hypothesis of fire-induced failure. To guide our evaluation of NIST's analyses, we will bring back the scientific

principle discussed in Chapter 1: *"Unprecedented causes should not, without good reasons, be posited to explain familiar occurrences.... [W]e properly assume, unless there is extraordinary evidence to the contrary, that each instance of a familiar occurrence was produced by the same causal factors that brought about the previous instances."*

Because NIST's hypothesis involves an unprecedented cause to explain *three* instances of a familiar occurrence in one day, each of which exhibited nearly all of the features of the same causal factor that brought about previous instances of that occurrence — namely, the procedure known as "controlled demolition" — the question we will ask is whether

NIST has provided “extraordinary evidence” to support its hypothesis.

Hypothetical Blast Scenarios and Thermite Use

The only substantive analysis that NIST performed regarding the hypothesis of controlled demolition was its consideration of “hypothetical blast scenarios” for the destruction of WTC 7, carried out under a contract with Applied Research Associates beginning in August 2006.

NIST’s analysis started with identifying a hypothetical blast event involving the minimum amount of explosive material required to fail Column 79. It determined that to be a linear-shaped charge consisting of nine pounds of RDX. From there, it performed analyses to assess how much window breakage and noise would result — and whether it was feasible for someone to plant such explosives in the building.



This video, which surfaced in 2008, clearly shows vertical sequences of explosions and window breakage as WTC 7 begins to collapse. It can be viewed at <http://AE911Truth.org/downloads/video/WTC7-West.mp4>

NIST concluded the following:

- *[T]he minimum charge (lower bound) required to fail a critical column (i.e., Column 79) would have produced a pressure wave that would have broken windows on the north and east faces of the building near Column 79. The visual evidence did not show such breakage....*
- *[T]he noise level at a distance of ½ mile would have been on the order of 130 dB to 140dB.... People on the street would have heard 9 lb of RDX go off a mile away....*
- *Preparations for a blast scenario would have been almost impossible to carry out on any floor in the building without detection....¹*

NIST’s analysis of “hypothetical blast scenarios” is

a textbook example of straw man tactics, where an argument is constructed and then refuted to give the impression that an opponent’s argument has been defeated, when in fact the refuted argument is not the opponent’s.

Proponents of the controlled demolition hypothesis have seldom, if ever, argued that a high explosive such as RDX was used to destroy WTC 7. Rather, as the evidence examined in Chapter 5 strongly suggests, the leading hypothesis is that an explosive form of thermite called “nano-thermite” — possibly in combination with some form of explosives and other incendiaries — was used to destroy WTC 7. Using nano-thermite, instead of the more powerful RDX, would allow a perpetrator to demolish a building while concealing the fact that he had planted explosives.

Even though NIST was fully aware of nano-thermite technology² and it knew that the leading hypothesis of controlled demolition involved some form of thermite, as evidenced by its FAQ (see below), it selected a “straw man” substance — RDX — for its hypothetical blast event. Thus, its analyses of the window breakage and noise associated with RDX are irrelevant.

Furthermore, the evidence examined in Chapter 4 contradicts NIST’s claim that explosions were not observed by eyewitnesses or captured on video. Indeed, explosions *were* observed by eyewitnesses and captured on video. As one person at the scene recounted, “[I]t looked like there was a shockwave ripping through the building and the windows all busted out.” Video evidence also contradicts NIST’s claim that window breakage did not occur. In particular, a video that surfaced in 2008 clearly shows vertical sequences of explosions and window breakage on the north face of WTC 7 as it began to collapse.³

In suggesting that “[o]ccupants, support staff, and visitors would have noticed evidence of such activities [i.e., placing charges],” NIST also assumed that the planting of explosives would have happened without the knowledge of someone responsible for security at WTC 7. But proponents of the controlled demolition hypothesis have seldom suggested that the planting of explosives could have been accomplished without the knowledge and complicity of someone in charge of security at WTC 7.



A photograph of WTC trusses with fireproofing.

NIST's analysis also assumed that a demolition of WTC 7 would have been executed in the manner of a typical commercial controlled demolition. But according to

researcher Jim Hoffman, "[E]xplosive devices could have been disguised as or concealed within legitimate equipment.... Numerous such possibilities are afforded by the properties of energetic materials." In fact, Hoffman argues, "Any such job would have been far simpler than the structural retrofit of the CitiCorp Tower" — a feat the owners successfully managed in 1978 without their tenants knowing about it, after learning that the building was likely to topple in a hurricane.⁴

Thermite Instead of Nano-Thermite

NIST advanced a second straw man argument when it tackled the idea in both of its FAQ documents that thermite or thermate alone were used to destroy the buildings. NIST gave the following answer in response to the question of whether it tested the steel for residues of thermite:

[Thermite] burns slowly relative to explosive materials.... 0.13 pounds of thermite would be required to heat each pound of a steel section to approximately 700 degrees Celsius.... [M]any thousands of pounds of thermite would need to have been placed inconspicuously ahead of time.... This makes it an unlikely substance for achieving a controlled demolition.

Once again, NIST constructed an easily refutable argument that is not the argument actually advanced by proponents of the controlled demolition hypothesis. It is well known that thermite and thermate alone do not possess the explosiveness needed to account for a large amount of the evidence of explosions that NIST itself ignored (see Chapters 3 and 4).

Had it been NIST's genuine intention "to determine whether explosives could have been used to cause the collapse[s]," it would have tested the steel for explosives and thermite residues.

Estimates of Fireproofing Dislodgement

The fire protection in WTC 1 and WTC 2 consisted primarily of "sprayed fire-resistive material," or SFRM. Some columns also had gypsum wallboard enclosures, and some had a combination of both.

NIST's probable collapse sequence depends heavily upon the dislodgement of these materials by the airplane impacts. In its final report on WTC 1 and WTC 2, NIST concluded:

The WTC towers likely would not have collapsed under the combined effects of aircraft impact damage and the extensive, multi-floor fires that were encountered on September 11, 2001, if the thermal insulation had not been widely dislodged or had been only minimally dislodged by the aircraft impact.⁵

Yet NIST produced remarkably little evidence to support its claim that fireproofing dislodgement significantly affected the structures.

Because such dislodgement would not have been visible from outside the buildings, the extent of dislodgement had to be estimated based on where NIST's aircraft impact simulations predicted damage to wall partitions or furnishings. At the very end of its investigation, NIST finally performed physical testing "to provide evidence regarding the assumption that...the SFRM used for thermal insulation of structural members was damaged and dislodged." This testing, contained in NIST's "Debris Impact Study," involved shooting 15 rounds from a shotgun at a flat steel plate and a metal bar coated with fireproofing inside a plywood box. Referring to that experiment, Kevin Ryan writes:

[I]t's not hard to see that these tests actually disproved their findings.... Nearly 100,000 blasts would have been needed based on NIST's own damage estimates, and these would have to be directed in a very symmetrical fashion to strip the columns and floors from all sides....

To put NIST's pivotal claim to rest, there was simply no energy available to cause fireproofing loss. Previous calculations by engineers at MIT had shown that all the kinetic energy from the aircraft was consumed in breaking columns,

*crushing the floors and destroying the aircraft itself. But NIST's tests indicate that 1 MJ of energy was needed per square meter of surface area to shear the fireproofing off... [T]he extra energy needed would be several times more than the amount of kinetic energy available to begin with.*⁶

Moreover, fireproofing dislodgement could not have contributed to the collapse of WTC 1, for it did not occur where the collapse initiated. As shown in Chapter 3, the collapse of WTC 1 started at the 98th

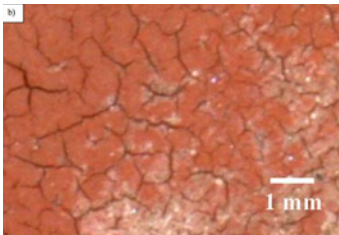


A photograph from NIST's "Debris Impact Study."

floor. Yet, according to NIST, no fireproofing was dislodged on any of the core columns on the 98th floor or on the floor trusses supporting the 99th floor.

How Hot Did the Steel Become?

Although nearly all of the WTC steel was destroyed before it could be inspected,⁷ NIST was able to obtain "about 236 pieces of WTC steel," as reported in its December 2003 Public Update. NIST explained that "[r]egions of impact and fire damage were emphasized in the selection of the steel for the Investigation." It then declared, "NIST believes that this collection of steel from the WTC Towers is adequate for the purposes of the Investigation."



This photograph shows the mud cracking of paint on the WTC steel after exposure to 250°C for one hour. Only three out of 170 tested areas on recovered exterior columns reached 250°C.

Out of the more than 170 areas that NIST tested on recovered exterior columns, it found only three locations that bore evidence of the steel reaching temperatures above 250°C. NIST also found that the steel "show[ed] no evidence of exposure to temperatures above 600°C for any significant time." It

obtained similar results from the two core columns recovered from the fire-affected floors.⁸ NIST therefore conceded:

*From the limited number of recovered structural steel elements, no conclusive evidence was found to indicate that pre-collapse fires were severe enough to have a significant effect on the microstructure that would have resulted in weakening of the steel structure.*⁹

However, despite its initial declaration that the collected steel was "adequate for the purposes of the investigation," NIST's report downplays the results of its testing, frequently reminding the reader that the exterior columns it tested were only three percent of the exterior columns on the fire floors and thus "cannot be considered representative of other columns on these floors."

From a statistical perspective, though, 170 areas is not an insignificant sample size from which to extrapolate, particularly when "regions of impact and fire damage were emphasized" and less than two percent of the sample reached temperatures above 250°C — not to mention the temperatures of 600° and higher used in NIST's computer model.

The aforementioned **Request for Correction** filed in 2007 asked that NIST's report "be revised to make its computer simulation conditions actually simulate physical reality." It noted:

NIST has provided no justification whatsoever for allowing its computer simulations to heat the steel to temperatures well above 600°C when its own physical tests reveal that little, if any, of the steel inside the WTC ever reached 600°C.

Yet NIST's response to the **Request for Correction** completely ignored the 170 areas on the exterior columns that NIST had tested. Instead, the response focused solely on the two core columns that it had also tested, making the obvious claim that they were too small a sample size from which to extrapolate. And it asserted the validity of its fire modeling, which, however informative, tells us nothing conclusive about the temperatures that the steel reached.

NIST's Computer Modeling

Because most of the WTC steel was destroyed before it could be inspected, the NIST WTC investigation had to rely almost entirely on computer modeling. The modeling performed by NIST failed — effectively disproving its hypothesis — in two ways:

1. It did not replicate the observed structural behavior of the buildings, and
2. It required significant manipulation — in other words, applying information known to be factually unsupported — in order to achieve collapse initiation.

Each failing of NIST's modeling will be discussed below — first for WTC 1 and WTC 2, then for WTC 7.

Modeling of WTC 1 and WTC 2

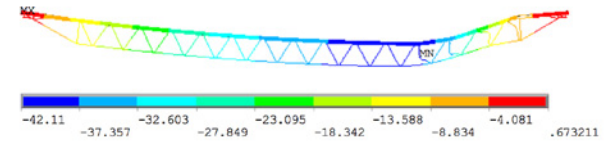
As discussed in Chapter 3, NIST provided no modeling to support its claim that the upper sections of WTC 1 and WTC 2 could accelerate through 92 stories and 76 stories, respectively, of intact structure “essentially in free fall.” NIST later admitted, “[B]ecause of the magnitude of deflections and the number of failures occurring, the computer models are not able to converge on a solution.... [W]e were unable to provide a full explanation of the total collapse.” NIST also refused to provide visualizations of its models showing collapse initiation.¹⁰

Among the many ways in which NIST manipulated its modeling of WTC 1 and WTC 2, two are critical to NIST's probable collapse sequence. First, the results of NIST's physical testing on floor assemblies subjected to fire conditions of 2,000°F showed that the floors sagged four inches after 60 minutes of exposure and six inches after 100 minutes of exposure, which were the approximate durations of the fires in WTC 2 and WTC 1, respectively.¹¹ However, NIST's modeling allowed for sagging of *more than 42 inches*.¹²

In its response to the 2007 *Request for Correction* and in its FAQs, NIST claimed that the floor assembly testing was not intended to be relevant to its structural analysis: Only fireproofed floor assemblies were tested, whereas the fireproofing on Sep-

tember 11 was widely dislodged. But the authors of the *Request for Correction* rejected that claim for a number of reasons:

1. What was the purpose of the testing if it was not to analyze the thermal-structural response of the towers?



This illustration from the NIST report shows a floor truss sagging 42 inches.

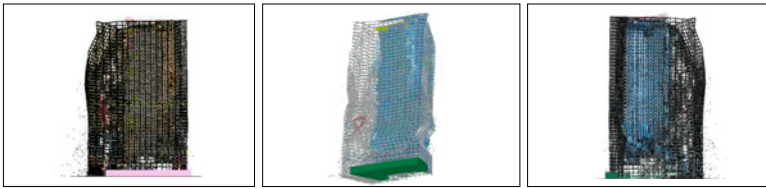
2. The tested floor assemblies actually had *less* fireproofing on them than the real WTC floor assemblies.
3. NIST did not substantiate its claim that fireproofing dislodgement significantly affected the structures, as discussed above.
4. The duration of the fires in the testing was much longer than the duration of the fires in the areas where NIST claimed the floors sagged.

The second critical way in which NIST manipulated its modeling of WTC 1 and WTC 2 was to artificially induce the inward bowing of exterior columns to the point of buckling (which NIST claimed initiated the collapses). Because NIST's model showed that floor sagging did not cause the exterior columns to bow inward to the point of failing, NIST applied an artificial lateral load of 5,000 pounds to each column from outside the building in order to make the exterior columns fail. In a feat of circular logic, NIST justified doing so in order to match the observed inward bowing.¹³

Modeling of WTC 7

As discussed in Chapter 4 of this booklet, NIST asserted that the three stages of collapse progression it measured for WTC 7 were “consistent with the results of the global collapse analyses discussed in Chapter 12 of NIST NCSTAR 1-9” — where NIST presented the results of its computer model.

However, when we view the model,¹⁴ we see — besides the fact that it stops after only two seconds,

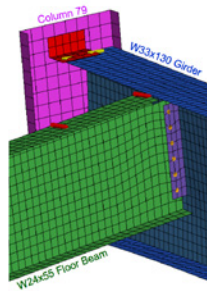


Above: The final frame from three different computer simulations showing WTC 7's collapse from the north, northwest, and south, respectively.

Below: The position of WTC 7 at zero, two seconds, and four seconds into its collapse, as seen from the northwest. NIST's modeling stops after two seconds or less. Therefore, it cannot be fully compared to videos of WTC 7's collapse. Nonetheless, we see that NIST's computer modeling fails to show a period of free fall and inaccurately predicts large deformations that are not observed in the videos.



which is well before the end of the collapse — that it fails to replicate the observed structural behavior in two important ways. First, it fails to show the 2.25 seconds of free fall that NIST finally acknowledged. Second, it shows large deformations of the building's exterior structure that are not observed in the videos.



This illustration from the NIST report shows the mechanism that NIST claims initiated the collapse of WTC 7: Floor beams (green) thermally expanded and pushed girder A2001 (blue) off of the seat connecting it to Column 79 (purple).

NIST also had to manipulate its modeling significantly just to get the collapse to initiate. Specifically — in order to make the floor beams under Floor 13 expand and push the critical girder (A2001) off its seat and allegedly trigger a total collapse of the building — NIST took the following steps:

1. It ignored the fact that the fire in the northeast section of Floor 12 had burned out over an hour before it supposedly caused the beams under Floor 13 to expand.
2. It omitted shear studs on girder A2001 that would have prevented the girder from being pushed off its seat.
3. It inexplicably heated the floor beams but not the floor slab above them, thus causing the floor beams, but not the slab, to expand. This

caused the shear studs connecting the floor beams and the slab to fail, which allowed the floor beams to move independently of the slab.

4. It ignored the fact that the floor beams could expand no more than 5 3/4 inches — less than the 6 1/4 inches required to push the girder off its seat — before shortening, caused by sagging, would overtake expansion.
5. It omitted web/flange stiffeners that would have prevented the bottom flange of the girder from folding (even if the beams had somehow expanded 6 1/4 inches).¹⁵

Had NIST modeled WTC 7 accurately, the mechanism that it claimed initiated the collapse would not have been feasible.

Conclusion

In this final chapter we examined four areas of analysis that NIST performed to support its hypothesis of fire-induced failure.

First, we found that NIST's analysis of "hypothetical blast scenarios" and the possible use of thermite were textbook examples of straw man tactics. We then found that NIST provided remarkably little evidence to support its claim that fireproofing dislodgement significantly affected the structures. Next, we saw that, although NIST conceded that "no conclusive evidence was found to indicate that pre-collapse fires were severe enough to...have resulted in weakening of the steel structure," it ignored the results of its testing and instead continued to use temperatures of 600°C and higher in its models. As for NIST's computer modeling, we found that it failed to replicate the observed structural behavior of the buildings and it required significant manipulation in order to achieve collapse initiation.

Did NIST provide "extraordinary evidence" to support its hypothesis?

The answer is "no." NIST fell far short of providing extraordinary evidence — not for lack of trying or lack of resources or lack of expertise, but because there *is* no evidence to support the hypothesis of fire-induced failure. ■

Appendix A: Eyewitness Accounts of Explosions

Identification

Michael Donovan, FDNY

"I got up, I got into the parking garages, was knocked down by the percussion. I thought there had been an explosion or a bomb that they had blown up there."

James Duffy, FDNY

Q. "When either tower came down, did you have any advanced warning?"

A. "Oh, no. I didn't know what it was when we were inside. I didn't know the building had collapsed, actually. I thought it was a bomb. I thought a bomb had gone off."

Julio Marrero, FDNY

"That's when I just broke down and cried at Bellevue Hospital, because it was just so overwhelming. I just knew that what happened was horrific. It was a bombing."

Timothy Hoppey, FDNY

"...that's when we heard the rumble. I looked up, and it was just a black cloud directly overhead. At that point I was thinking it was a secondary explosion."

John Malley, FDNY

"As we walked through those revolving doors, that's when we felt the rumble. I felt the rumbling, and then I felt the force coming at me. I was like, what the hell is that? In my mind it was a bomb going off. The pressure got so great, I stepped back behind the columns separating the revolving doors. Then the force just blew past me."

William Reynolds, FDNY

"After a while, and I don't know how long it was, I was distracted by a large explosion from the south tower and it seemed like fire was shooting out a couple of hundred feet in each direction, then all of a sudden the top of the tower started coming down in a pancake..."

Q. "Bill, just one question. The fire that you saw, where was the fire? Like up at the upper levels where it started collapsing?"

A. "It appeared somewhere below that. Maybe twenty floors below the impact area of the plane..."

Q. "You're talking about the north tower now; right?"

A. "Before the north tower fell. He said, 'No.' I said, 'Why not? They blew up the other one.' I thought they blew it up with a bomb. I said, 'If they blew up the one, you know they're gonna blow up the other one.'"

Thomas Turilli, FDNY

"The door closed, they went up, and it just seemed a couple seconds and all of a sudden you just heard like it almost actually that day sounded like bombs going off, like boom, boom, boom, like seven or eight, and then just a huge wind..."

Louie Cacchioli, Louie, FDNY

"We were the first ones in the second tower after the plane struck. I was taking firefighters up in the elevator to the 24th floor to get in position to evacuate workers. On the last trip up a bomb went off. We think there was bombs set in the building."

T. Inman, PAPD (Port Authority Police Dept.)

"As a roll call was being taken of the responding Detectives, Tower #2 began to collapse. This occurred after a secondary explosion on the west side of the tower that appeared to take place in the area of the high 60's. The area above the secondary explosion actually leaned to the west and then the collapse took place."

Power

Frank Campagna, FDNY

"That's when it went. I looked back. You see three explosions and then the whole thing coming down. I turned my head and everybody was scattering."

Roy Chelsen, FDNY

"All of a sudden we heard this huge explosion, and that's when the tower started coming down."

Paul Curran, FDNY

"With that, all a sudden the tower went completely — a horrendous noise, a very, very tremendous explosion, and a very heavy wind came through the tower. The wind almost knocked you down."

Gary Gates, FDNY

"I looked up, and the building exploded, the building that we were very close to, which was one tower. The whole top came off like a volcano."

Jerry Gombo, FDNY

"...it felt sort of like an earthquake. The sky darkened and you heard this thunderous roar. It was like a volcano, if you will, not that I ever experienced a volcano, but I guess that's the way I could describe it, and this cloud just coming down. The ground was shaking and this roar..."

Edward Kennedy, FDNY

"We took two steps, there was a tremendous boom, explosion, we both turned around, and the top of the building was coming down at us. With this I just turned to Richie and said run."

George Kozlowski, FDNY

"As we were walking, we heard — we thought it was another plane coming. It was like a big shhhhhh. A thousand times louder than that. It sounded like a missile coming and we just started booking. We took off like bats out of

hell. We made it around the corner and that's when the shit hit the fan right then and there. We heard that loud and then ba boom. I just — it was like an earthquake or whatever. A giant, giant explosion...Then this big gust came and I just went flying, maybe 30, 40 feet. Tumbling. I got up, got on my hands and knees because all of the white shit was all over me. I just kept crawling. My ears were like deaf, you know, when you hear a giant firecracker or something."

Julio Marrero, FDNY

"...I heard a loud bang. We looked up, and we just saw the building starting to collapse. I looked over and started to scream at my partner, which he was inside the vehicle...I was screaming from the top of my lungs, and I must have been about ten feet away from her and she couldn't even hear me, because the building was so loud, the explosion, that she couldn't even hear me."

Edward Martinez, FDNY

"...I heard like a big explosion, a tremendous explosion, let me put it that way and rumbling sound. At that time I started seeing things coming down..."

Keith Murphy, FDNY

"I had heard right before the lights went out, I had heard a distant boom boom boom, sounded like three explosions. I don't know what it was. At the time, I would have said they sounded like bombs, but it was boom boom boom and then the lights all go out...I would say about 3, 4 seconds, all of a sudden this tremendous roar. It sounded like being in a tunnel with the train coming at you. It sounded like nothing I had ever heard in my life, but it didn't sound good. All of a sudden I could feel the floor started to shake and sway. We were being thrown like literally off our feet, side to side, getting banged around and then a tremendous wind started to happen. It probably lasted maybe 15 seconds, 10 to 15 seconds. It seemed like a hurricane force wind. It would blow you off your feet..."

John Murray, FDNY

"...we were standing there watching the north tower and not even paying attention to the south tower. Then you look up and it's like holy shit, the building didn't come down, it shot straight out over our heads, like straight across West Street. Holy shit, there is no fucking way we are going to out run this thing."

Richard Smiouskas, FDNY

"All of a sudden there was this groaning sound like a roar, grrrr. The ground started to shake...It looked like an earthquake. The ground was shaking. I fell to the floor. My camera bag opened up. The cameras went skidding across the floor. The windows started exploding in...I didn't know exactly what was going on outside. I'm thinking maybe the building snapped in half. I'm thinking maybe a bomb blew up. I'm thinking it could have been a nuclear."

C. Krueger, PAPD

"While searching the floor there was a tremendous explosion knocking me off my feet onto the floor, I was covered with debris..."

T. Marten, PAPD

"Then I heard a tremendous explosion and I looked up and saw Building Two snap at the top and collapse into it self."

Pt. Middleton, PAPD

"I was approximately one block away from Tower One when Tower Two appeared to explode at the roof top and several floors below. Then fire balls and debris shot out of the windows and rocketed into the skies and fall [fell?] below. As the Building began to disintegrate before your very eyes, there came an earth-shaking roar which grew louder and louder. Then all of a sudden a huge gigantic billing [billowing?] cloud filled with smoke, and ash. Pieces of cement particles and sections of the building came raining down...As the ash and cement particles began to build up under the vehicle it became pitch black out and suddenly the oxygen left the air and an intense heat was felt."

Patty Sabga, Journalist, CNN

Aaron Brown: "Patty, are you there?"

Patty Sabga: "Yes, I'm here."

Aaron Brown: "Whaddya got?"

Patty Sabga: "About an hour ago I was on the corner of Broadway and Park Place—that's about a thousand yards from the World Trade Center—when the first Tower collapsed. It was a *massive* explosion...When that explosion occurred it was like a scene out of a horror film..."

Teresa Veliz, civilian

"BOOM! The glass doors at the top of the escalator shattered. I thought it was a bomb. But then a huge wind, with the force of a hurricane, swept across us. I don't know what happened to the people standing in front of us, but I think they were blown away."

Pattern

Richard Banaciski, FDNY

"We were there I don't know, maybe 10, 15 minutes and then I just remember there was just an explosion. It seemed like on television they blow up these buildings. It seemed like it was going all the way around like a belt, all these explosions..."

Edward Cachia, FDNY

"As my officer and I were looking at the south tower, it just gave. It actually gave at a lower floor, not the floor where the plane hit, because we originally had thought there was like an internal detonation explosives because it went in succession, boom, boom, boom, boom, and then the tower came down."

Frank Cruthers, FDNY

"And while I was still in that immediate area, the south tower, 2 World Trade Center, there was what appeared to be at first an explosion. It appeared at the very top, simultaneously from all four sides, materials shot out horizontally. And then there seemed to be a momentary delay before you could see the beginning of the collapse."

Karin Deshore, FDNY

"Somewhere around the middle of the World Trade Center, there was this orange and red flash coming out. Initially it was just one flash. Then this flash just kept popping all the way around the building and that building had started to explode. The popping sound, and with each popping sound it was initially an orange and then red flash came out of the building and then it would just go all around the building on both sides as far as I could see. These popping sounds and the explosions were getting bigger, going both up and down and then all around the building."

Brian Dixon, FDNY

"I was watching the fire, watching the people jump and hearing a noise and looking up and seeing — it actually looked — the lowest floor of fire in the south tower actually looked like someone had planted explosives around it because the whole bottom I could see — I could see two sides of it and the other side — it just looked like that floor blew out."

Thomas Fitzpatrick, FDNY

"All we saw was a puff of smoke coming from about 2 thirds of the way up. Some people thought it was an explosion. I don't think I remember that. I remember seeing, it looked like sparkling around one specific layer of the building. I assume now that that was either windows starting to collapse like tinsel or something. Then the building started to come down. My initial reaction was that this was exactly the way it looks when they show you those impsions on TV."

Christopher Fenyo, FDNY

"About a couple minutes after George came back to me is when the south tower from our perspective exploded from about midway up the building. We all turned and ran... [p. 5]...At that point a debate began to rage because the perception was that the building looked like it had been taken out with charges."

Stephen Gregory, FDNY

I thought that when I looked in the direction of the Trade Center before it came down, before No. 2 came down, that I saw low-level flashes. In my conversation with Lieutenant Evangelista, never mentioning this to him, he questioned me and asked me if I saw low-level flashes in front of the building, and I agreed with him because I thought — at that time I didn't know what it was. I mean, it could have been as a result of the building collapsing, things exploding, but I saw a flash flash flash and then it looked like the building came down."

Q. "Was that on the lower level of the building or up where the fire was?"

A. "No, the lower level of the building. You know like when they demolish a building, how when they blow up a building, when it falls down? That's what I thought I saw. And I didn't broach the topic to him, but he asked me. He said I don't know if I'm crazy, but I just wanted to ask you because you were standing right next to me. He said did you see anything by the building? And I said what do you mean by see anything? He said did you see any flashes? I said, yes, well, I thought it was just me. He said no, I saw them, too."

Daniel Rivera, FDNY

"Then that's when I kept on walking close to the south tower and that's when that building collapsed."

Q. "How did you know that it was coming down?"

A. "That noise. It was a noise."

Q. "What did you hear? What did you see?"

A. "It was a frigging noise. At first I thought it was—do you ever see professional demolition where they set the charges on certain floors and then you hear 'pop, pop, pop, pop, pop'? That's exactly what—because I thought it was that. When I heard that frigging noise, that's when I saw the building coming down."

Kenneth Rogers, FDNY

"...we were standing there with about five companies and we were just waiting for our assignment and then there was an explosion in the south tower, which according to this map, this exposure just blew out in flames. A lot of guys left at that point. I kept watching. Floor after floor after floor. One floor under another after another and when it hit about the fifth floor, I figured it was a bomb, because it looked like a synchronized deliberate kind of thing."

Pt. Middleton, PAPD

"As I continued to wave them back periodically you would hear a loud boom go off at the top of tower one...After approximately 15 minuets [minutes] suddenly there was another loud boom at the upper floors, then there was a series of smaller explosions which appeared to go completely around the building at the upper floors. And another loud earth shattering blast with a large fire ball which blew out more debris and at that point everyone began to run north on West Broad street. As the building began to crumble...we were over taken by another huge cloud of dust..."

John Bussey, Wall Street Journal

"Unknown to the dozens of firefighters on the street, and those of us still in offices in the neighborhood, the South Tower was weakening structurally. Off the phone, and collecting my thoughts for the next report, I heard metallic crashes and looked up out of the office window to see what seemed like perfectly synchronized explosions coming from each floor, spewing glass and metal outward. One after the other, from top to bottom, with a fraction of a second between, the floors blew to pieces. It was the building apparently collapsing in on itself, pancaking to the earth."

Ross Milantch, employee, Chase Manhattan Bank

"It started exploding...It was about the 70th floor. And each second another floor exploded out for about eight floors, before the cloud obscured it all."

A full compilation of the 156 eyewitness accounts identified by Dr. Graeme MacQueen can be viewed at <http://AE911Truth.org/downloads/156eyewitnessaccounts.pdf>.

Appendix B: Accounts Indicating Foreknowledge of WTC 7's Destruction

Early Predictions

Michael Currid, FDNY*

Someone from the Office of Emergency Management told us that this building was in serious danger of collapse.... Rich, a few other people and I went inside to the stairwells and started yelling up, "Drop everything and get out!"

Dean E. Murphy, Editor, "September 11: An Oral History," 2002, pp. 175-176.

NIST NCSTAR 1-8

At approximately 11:30 AM, FDNY assigned a Chief Officer to take charge of operations at WTC 7.... When the Chief Officer in charge of WTC 7 got to Barclay Street and West Broadway, numerous firefighters and officers were coming out of WTC 7. These firefighters indicated that several blocks needed to be cleared around WTC 7 because they thought that the building was going to collapse.

Chief Peter Hayden, FDNY, BBC Conspiracy Files: 9/11 – The Third Tower

Narrator: Just after midday, firefighters were watching Tower 7 nervously. The Deputy Chief of the New York Fire Department that day [Peter Hayden] remembers the scene.... "[W]e had a discussion with one particular engineer there, and we asked him, if we allowed it to burn could we anticipate a collapse, and if so, how soon? And it turned out that he was pretty much right on the money. He said, 'In its current state you have about five hours.'"

Establishing a Safety Zone and Waiting

Captain Ray Goldback, FDNY

There was a big discussion going...about pulling all of our units out of 7 World Trade Center. Chief Nigro didn't feel it was worth taking the slightest chance of somebody else getting injured. So at that point we made a decision to take all of our units out of 7 World Trade Center because there was a potential for collapse.... Made the decision to back everybody away, took all the units and moved them all the way back toward North End Avenue, which is as far I guess west as you could get on Vesey Street, to keep them out of the way.

Frank Fellini, FDNY

For the next five or six hours we kept firefighters from working anywhere near that building....

Frank Conguista, FDNY

While we were searching the subbasements, they decided that 7 World Trade Center...was going to collapse.

David Moriarty, FDNY

Then I remember seeing like a few different chiefs at the corner throughout the day. They became very concerned about the condition of Seven World Trade and where we were in vicinity to that. They kept announcing the collapse and who's moving, and we got pushed further and further west.

Vincent Mazza, FDNY

Later on in the day as we were waiting for seven to come down, they kept backing us up Vesey, almost like a full block. They were concerned about seven coming down, and they kept changing us, establishing a collapse zone and backing us up.

Decosta Wright, FDNY EMT

[B]asically they measured out how far the building was going to come, so we knew exactly where we could stand.... Five blocks away.... Exactly right on point, the cloud just stopped right there.

Joseph Fortis, FDNY

They pulled us all back at the time, almost about an hour before it, because they were sure – they knew it was going to come down, but they weren't sure. So they pulled everyone back, and everybody stood there and we actually just waited and just waited and waited until it went down, because it was unsafe. They wouldn't let anyone next to I guess the two piles, we would call them, where one and two was. We stood back. We waited.

Media Reports

Aaron Brown, CNN

4:10 PM (1 hour and 10 minutes prior to the collapse): We are getting information now that one of the other buildings, Building 7 in the World Trade Center complex is on fire and has either collapsed or is collapsing.... Now we are told that there is a fire there and that building may collapse as well, as you can see.

Phil Hayton, BBC News

4:57 PM (23 minutes prior to the collapse): We've got some news just coming in actually that the Salomon Brothers building in New York right in the heart of Manhattan has also collapsed.

Hayton, 5:00 PM: The 47-story Salomon Brothers', situated very close to the World Trade Center, has also just collapsed.

Hayton, 5:07 PM: Now more on the latest building collapse in New York. You might have heard just a few moments ago I was talking about the Salomon Brothers building [WTC 7] collapsing. And indeed it has.... And it seems that this was not a result of a new attack. It was because the building had been weakened during this morning's attacks.... Jane, what more can you tell us about the Salomon Brothers building and its collapse?

Jane Standley, BBC News

5:08 PM: Well, really only what you already know. [Behind Standley the building is still standing. At 5:09 PM the caption on the bottom of the screen read: "The 47-storey Salomon Brothers building close to the World Trade Centre has also collapsed."]]

Ashleigh Banfield, MSNBC

Time unknown: The tall one is number 7 World Trade Center. I've heard several reports from several different officers now that that is the building that is gonna go down next. In fact, one officer told me they're just waiting for that to come down at this point.... Oh my god.... This is it.

Banfield, after the collapse, exact time unknown: We had been warned. They were just waiting for this one to come down.... We'd been cleared five different times northward from Ground Zero.

Brian Williams, MSNBC

Minutes after the collapse: What we've been fearing all afternoon has apparently happened. We were watching number 7 World Trade.... This was a 40-story building they'd been watching all day.... We are on the phone with New York Fire Department David Rastuccio.... Can you confirm it was number 7 that just went in?... And you guys knew this was coming all day?

Planning or Consideration

David Rastuccio, FDNY, interviewed by Brian Williams, MSNBC

We had heard reports that the building was unstable and that eventually it would come down on its own or it would be taken down.

Indira Singh, EMT, on Guns and Butter Radio

By noon or one o'clock, they told us we had to move from that triage site...because Building 7 was going to come down or being brought down.

[Interviewer: Did they actually use the word "brought down" and who was it that was telling you that?] The fire department...and they did use the word "we're going to have to bring it down."

Jeffrey Shapiro, FOXNews.com

Shortly before the building collapsed, several NYPD officers and Con-Edison workers told me that Larry Silverstein...was on the phone with his insurance carrier to see if they would authorize the controlled demolition of the building — since its foundation was already unstable and expected to fall.

Larry Silverstein, WTC Leaseholder, on PBS

I remember getting a call from the fire department commander telling me that they were not sure they were gonna be able to contain the fire. I said, "You know we've had such a terrible loss of life, maybe the smartest thing to do is pull it." And they made that decision to pull and we watched the building collapse.

**All accounts from FDNY personnel are from the FDNY World Trade Center Task Force Interviews unless otherwise noted.*

Endnotes

Introduction

1. Public opinion polls by Scripps Survey Research Center, Angus Reid, and YouGov have found 63 to 77 percent of Americans believe the destruction of WTC 1 and WTC 2 was caused by airplane impacts and fires. http://www.aei.org/wp-content/uploads/2013/11/-public-opinion-on-conspiracy-theories_181649218739.pdf and http://rethink911.org/docs/ReThink911_YouGov_Poll_Results_Summary.pdf.
2. The above-referenced public opinion polls found 13 to 16 percent of Americans believe the destruction of WTC 1 and WTC 2 was caused by controlled demolition.
3. As of the publication of this booklet, 2,353 verified architects and engineers have signed the Architects & Engineers for 9/11 Truth petition calling for a new investigation into the destruction of WTC 1, WTC 2, and WTC 7.

Chapter 1

1. Griffin, David Ray: *The Mysterious Collapse of World Trade Center 7* (2009), p. 23.
2. NIST: *Analysis of Needs and Existing Capabilities for Full-Scale Fire Resistance Testing* (October 2008).

Chapter 2

1. Griffin, p. 20.
2. Glanz, James and Lipton, Eric: *City in the Sky: The Rise and Fall of the World Trade Center* (2003), p. 330.
3. *Ibid.*, pp. 330–332.
4. U.S. House of Representatives Committee on Science: *Hearing: The Investigation of the World Trade Center Collapse: Findings, Recommendations, and Next Steps* (May 1, 2002), p. 27.
5. At the 2015 Annual Business Meeting of the American Institute of Architects (AIA), during debate on a proposed resolution calling for the AIA to officially support a new investigation of the collapse of WTC 7, Anthony Schirripa, FAIA, former president of the New York AIA Chapter, stated: “[WTC 7] collapsed because of a raging fire caused by 6,000-plus gallons of diesel fuel that fed the New York City Emergency Response Center. You need to admit that to yourselves.”
6. At the above-referenced 2015 AIA Annual Business Meeting, Donald King, FAIA, a member of the AIA Strategic Council, stated: “The collapse of that building, according to the report, was caused by massive, intensive fire and the collision of debris from the collapse of World Trade Center Building, or Tower 1.... It was extreme fire and structural damage that caused the collapse.”
7. *Ibid.*

Chapter 3

1. Griffin, p. 17.
2. Hart, F.; Henn, Walter; and Sontag, H.: *Multi-Storey Buildings in Steel* (1978).
3. NIST: *NCSTAR 1-6*, pp. 156, 169.
4. Ryan, Kevin: *A New Standard for Deception* video (June 2006). <https://youtu.be/OuGI82tOhEI>.
5. NIST: *Questions and Answers about the NIST WTC Towers Investigation*, Question #11.
6. NIST: *NCSTAR 1*, p. 146.
7. Gross, John: October 2006 lecture at the

University of Texas, Austin. <https://youtu.be/wcqf5tL887o>.

8. NIST: *NCSTAR 1*, pp. 34, 48.
9. Chandler, David: “The Destruction of the World Trade Center North Tower and Fundamental Physics,” *Journal of 9/11 Studies* (February 2010).
10. Szamboti, Anthony and Johns, Richard: “ASCE Journals Refuse to Correct Fraudulent Paper Published on WTC Collapses,” *Journal of 9/11 Studies* (September 2014).
11. The 33Mkg mass is the estimated mass of the upper section of WTC 1 based on data provided by NIST. The 54Mkg mass is Bazant and Le’s incorrect estimate of the upper section’s mass, though it still yields observable decelerations when the values for the resistance of the columns and the lower section’s floor mass are corrected.
12. <https://youtu.be/CcvvhVv-cAE>.
13. The calculation of the energy required to pulverize the concrete and dismember the structures of WTC 1 and WTC 2, and the gravitational potential energy contained in each building, is based upon the following calculations and assumptions:

Gravitational Potential Energy Contained in Each Building (i.e. Total Building Mass): 2.765 mega kilograms [single floor mass of upper 12 floors [see *Some Misunderstandings Related to WTC Collapse Analysis*]], which equates to 2.765 x 10⁶ joules x 105 [number of floors [5 floors are subtracted from 110 floors to account for 5-story debris pile]] x 1.05 [to account for increasing mass of lower floors due to increasing thickness of columns] x 9.81 [gravitational constant] x 170 [the distance in meters to the center of gravity of the building above the 5th floor] = 508.4 x 10⁹ joules of gravitational potential energy.

Energy Required to Pulverize Concrete: Estimates vary based on kind of concrete, assumed ratio of loading area to slab area, and assumed size of dust particles generated. Based upon scenarios detailed in a 2012 publication “Energy absorption potential of light weight concrete floors, Can J of Civ Eng pp. 1193–1201, authored by R. M. Korol and K.S. Sivakumaran,” an estimate of 857.5 x 10⁹ joules is obtained.

Energy Required to Destroy Perimeter Columns: 120 [number of perimeter columns assumed to fail by mid-height hinge plastic bending] x 9.11 x 10⁶ joules [energy required to cause mid-height hinge plastic bending] x 105 [number of floors] + 120 [number of perimeter columns assumed to fail by crushing] x 8.348 x 10⁶ [energy required to cause crushing] x 105 [number of floors] = 219 x 10⁹ joules. The energy values noted above are based on two publications by Korol and Sivakumaran: “Reassessing the Plastic Hinge Model for Energy Dissipation of Axially Loaded Columns [J of Structures, 2014, 7 pages] and “Energy Dissipation Potential of Square Tubular Steel Columns Subjected to Axial Compression [Inter. Review of Civ. Eng., 2011, pp. 46–51].

Energy Required to Destroy Core Columns: 47 [number of core columns, all assumed to fail by mid-height hinge plastic bending] x 36,070 joules [energy required to cause mid-height hinge plastic bending] x 105 [number of floors] = 178 x 10⁹ joules.

Total Energy Required to Pulverize the Concrete and Dismember the Steel Structures (i.e. the sum of the three previous calculations): {857.5 + 219 + 178} x 10⁹ joules = 1,254.5 x 10⁹ joules, or 1,255 gigajoules.

14. Jones, Steven (et al.): “Extremely High Temperatures during the World Trade Center Destruction,” *Journal of 9/11 Studies* (February 2008).
15. Ryan, Kevin: “High Velocity Bursts of Debris from Point-Like Sources in the WTC Towers,” *Journal of 9/11 Studies* (June 2007).
16. http://911research.wtc7.net/wtc/evidence/videos/docs/wtc1_jets.mpeg.

17. NIST: *NCSTAR 1*, p. 146.

Chapter 4

1. NIST: *NCSTAR 1A*, p. 48.
2. NIST: *NCSTAR 1A Draft Report*, p. 40. The term “descent speed” was an error made by NIST. “Acceleration” was meant.
3. This condensed description of the three stages of WTC 7’s collapse appears in NIST’s WTC 7 FAQs.
4. <https://youtu.be/xpoAmEGdsn4>.
5. http://whatreallyhappened.com/IMAGES/wtc7_med2.wma.
6. <https://youtu.be/b4z-Wrp1pY8>.
7. Hess: <https://youtu.be/6e3K9jcPdXc>; Jennings: <https://youtu.be/gwJI0R2jza4>.
8. Griffin, pp. 84–111.
9. https://youtu.be/cU_43SwWD9A.

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1. NIST: *NCSTAR 1-5A*, pp. 374–376.
2. <https://youtu.be/lDnbfXLUyL4>.
3. <https://youtu.be/nsw2j-3MCMg>.
4. <https://youtu.be/KtyrMt7GzyE>.
5. <https://youtu.be/wcqf5tL887o>.
6. Glanz, James and Lipton, Eric: “A Search for Clues in the Towers’ Collapse,” *The New York Times* (February 2, 2002).
7. Killough-Miller, Joan: “The Deep Mystery of Melted Steel,” *WPI Transformations* (Spring 2002).
8. Griffin, pp. 43, 282. Griffin describes an email exchange between researcher Shane Geiger and NIST public affairs officer Gail Porter, which Geiger shared with Griffin.

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1. NIST: *NCSTAR 1-9*, p. 357.
2. Ryan, Kevin: “The Top Ten Connections Between NIST and Nano-Thermite,” *Journal of 9/11 Studies* (July 2008).
3. <http://AE911Truth.org/downloads/video/WTC7-West.mp4>.
4. Hoffman, Jim: *Frequently Asked Questions: Controlled Demolition*. <http://911research.wtc7.net/faq/demolition.html>.
5. NIST: *NCSTAR 1*, p. xxxviii.
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7. U.S. House of Representatives Committee on Science.
8. NIST: *NCSTAR 1-3*, p. xli.
9. NIST: *NCSTAR 1-3C*, p. 235.
10. Parker, David: “WTC investigators resist call for collapse visualization,” *New Civil Engineer* (October 6, 2005).
11. NIST: *NCSTAR 1-6B*, Chapters 4 and 5. Note: NIST’s floor assembly tests were conducted on half-size trusses.
12. NIST: *NCSTAR 1-6*, p. 86.
13. NIST: *NCSTAR 1-6D*, pp. 180, 181, and Appendix A.
14. http://wtcdata.nist.gov/gallery2/v/NIST+Materials+and+Data/Computer+Simulations/WTC7_Structural+Response.
15. NIST public affairs officer Michael Newman confirmed in email correspondence with researcher David Cole on October 25, 2013, that the web/flange stiffeners on girder A2001 were omitted from NIST’s computer model of WTC 7.

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About Architects & Engineers for 9/11 Truth

Architects & Engineers for 9/11 Truth (AE911Truth) is a 501(c)(3) non-profit organization dedicated to researching and disseminating scientific information about the destruction of the World Trade Center skyscrapers on September 11, 2001.

As of the printing of *Beyond Misinformation: What Science Says About the Destruction of World Trade Center Buildings 1, 2, and 7*, AE911Truth represents 2,353 verified architects and engineers — and counting — who have signed our petition calling upon the U.S. Congress to open a truly independent investigation into the World Trade Center destruction.

To learn more about AE911Truth and sign our petition, visit AE911Truth.org.



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*World Trade Center Building 7 fell symmetrically at free-fall acceleration
into its own footprint at 5:20 PM on September 11, 2001.*