WTC CD?

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There is a lot of conjecture floating around the internet about what happened on 9/11/01 in regards to the WTC. A lot of armchair demolitions experts assert that the WTC buildings that fell on that day fell because of means other than airplanes crashing into them and causing fires. The armchair demo expert conspiracy theorists (CTers) assert that it is controlled demolitions (CD). Being a reasonable guy, I agree with the experts. Call me gullible, but show me a plane smashing into a building and that building falling down, and I'm convinced it was the plane.

Although my expertise on the topic consists of no more than the ability to read, a working computer, and an internet connection, my goal here is to show that CD simply isn't possible given the conditions of the building. Let's forget the sheer absurdity of the situation. Let's assume that somehow in the months/years beforehand secret demolitions teams were able to infiltrate the towers unseen by both people and cameras and plant explosives. Let's assume that in that time they were able to rip the walls open, plant the devices, and fix the walls and none of the thousands of people that walked the halls of those buildings every day noticed the wet paint and fresh drywall. Let's assume that whatever shadow organization had the trillions of dollars to pay off the hundreds of thousands of people from a variety of backgrounds and allegiances to turn a blind eye. Just ignore your common sense. It's difficult, I know, and that pain you feel in your brain is natural.

As stated earlier, in order to explain the ridiculousness of CD, I'm going to have to give that theory the best possible chance of being probable. In order to do that, I'm going to focus solely on WTC7, for reasons outlined below. For clarity's and background's sake, National Institute of Technology and Standards (NIST) has an ongoing, but incomplete, investigation into the building. Their basic theory is that the tower was damaged below floor 13 of the 47 story tower by thousands of tons of concrete, steel, and other debris from one or more of the other towers, and that structural damage spread first vertically, then horizontally coupled by weakened steel over seven hours, and eventually the structure was so weak the weight of the building forced it down[1]. The Federal Emergency Management Agency (FEMA) agrees, but contends that the seven hours of fire contributed more significantly[2]. Both organizations claim to have spent thousands of man-hours going through thousands of documents, films, and photographs with individuals of expertise both in and out of their respective organizations, using knowledge of physics, mathematics, and chemistry I can't possibly hope to match, understand, or verify. They've come up with the above theory, and found no evidence whatsoever to indicate explosives. In fact, most experts in any field agree with their conclusions. As you narrow their fields down to fields that would have any knowledge about structural failure and demolitions, the number of believers in WTC CD progressively gets smaller eventually nearing zero (One man, Danny Jowenko touted as the most proficient demolitions expert in the Netherlands has said that CD is a possibility, but even the circumstances around that is questionable. There are videos of his opinion on YouTube[3].)

To conclude the introduction and background and move onto the interesting part, why I feel that WTC7 is the best candidate for CD is as follows: The building was only struck by tons of concrete, steel, and other debris and not an airplane. And yes, I know that only is a bad word choice. The reason this is important is the temperature is in debate because it wasn't directly introduced to jet fuel (although it's not impossible). The next reason is the structural damage is in debate, some feel it wasn't sufficient to cause the collapse without an extra push, the push in this case being the force from many explosions. The final reason is that the building stood for seven hours.

Of course, with no evidence of a specific explosive used, to a CTer that's an invitation to imply that any explosive was used. Given the undeniable facts from above, a demolitions team would need an explosive that can be remotely detonated that can survive a severe impact and varying degrees of extreme heat. Oh, and the detonation devices would also have to survive that. I think the best way to go about this is to outline a variety of explosives[4][5], so that's where I will begin.

All explosives are designed to, through a chemical reaction at the molecular level, expel energy. This chemical reaction is initiated in a variety of ways depending on the explosive type, generally modern high explosives are stable, meaning they're difficult to set off by accident, and require some type of detonator and sometimes a booster charge, a primary explosive used to trigger the secondary explosive.[6] Since I've mentioned it, you're probably wondering what primary and secondary explosives are. There are two types of explosives, low and high. An example of low would be black powder, and high would be TNT. High explosives are also categorized by their sensitivity; that is their tendency to detonate when exposed to shock, friction, or heat, into two categories: Primary and secondary. Primary explosives are extremely sensitive and very dangerous to handle, and as such small amounts are often used to initiate secondary explosives as those tend to be more stable.[7]. It's also worth noting that many explosives leave toxic residues that can remain for years in the area and effect health and the environment[8]. However, since the investigation into WTC7 is still ongoing, and again to give the best possibility of CD, I'll assume that it's possible the contaminants are still there, but haven't been found yet. Lastly, many explosives suffer from hygroscopicity, which is the ability to retain water. Water is detrimental to an explosives power, and may even change the chemical composition of an explosive over time. This basic information is important because not only must the explosive survive the extreme conditions, but so must the booster charge if needed, and the detonator that often contains low or primary explosives, or both, and the means to trigger the detonator remotely.

Two more facts are necessary before we look at the types of explosives that could be used. Since explosives are typically set off by the shockwave created by the blasting cap, shock must be considered. No one really knows an exact measurement of the amount of energy transferred from WTC1 to WTC7 from the impact of the debris, I can't present an exact number. However, 10^{12} joules was the potential energy of the collapse of

WTC1[9]. Some of this energy was transferred, and in the case of explosives that are sensitive to impact, much less of the possible amount would be required. The other fact is the heat of the building. Both FEMA and the NIST estimate around 1000-1200 degrees Celsius[10][11]. I've also found proposed temperatures as low as 257 degrees Celsius[12]. Now that I've defined the conditions of the building it's time to take a look at some explosives and see how they'd fare.

First up are low explosives. These are primarily used as propellants, for bullets or rockets, but can and have been used as explosives in the past. This group includes black powder and smokeless powder.

Black powder, also known as gunpowder, is one of the oldest utilized explosives with the first recorded discovery at 1000 AD. It is still used to today mainly in fireworks. Black powder is extremely unstable. It is somewhat insensitive to shock and friction, but very sensitive to heat and open flame[13], all of which there were an abundance of. Additionally, gunpowder is expected to ignite around 232 degrees C (450 F)[15], which is well below even the most conservative estimates of WTC7. All in all, it's a poor candidate.

Smokeless powder is the propellant replacement to black powder. As with black powder it is sensitive to impact, heat, and flame. It's ignition temperature is even lower than that of black powder, coming in at around 160 degrees C (320 F)[16], which is again much lower than WTC7 making it an even more unlikely explosive.

The next group of explosives under the proverbial microscope is high explosives. The first sub-group of high explosives is primary. Explosives in this group are generally put here based on their relative sensitivity as compared to PETN. These explosives tend to be highly volatile under all but the most controlled conditions and tend to be very dangerous to handle. Their primary use is in small amounts put into a position to detonate more stable explosives, like being in a blasting cap. Explosives that fall into this category are Lead Azide, Lead Styphnate, Mercury Fulminate and Tetracene.

Lead Azide is a common detonating agent. It has a higher temperature of ignition than most primary explosives, and is a more effective detonating agent than mercury fulminate. However, it is highly sensitive to heat, friction, and impact. It is even more sensitive than nitro glycerine[17], dropping a 2kg weight from 5 inches away will cause it to detonate[20], and the higher temperature isn't that high, coming in at 350 degrees C (662 F)[18] which is well within the estimates of WTC7. Lead Azide as a stand alone or in a detonator would not work because of it's extreme impact sensitivity and it's comparably low sensitivity to heat.

Lead Styphnate is also a common detonating agent. It is more sensitive to shock and heat than lead azide or mercury fulminate, and it is extremely sensitive to electricity, so sensitive in fact that a static charge from the human body can cause it to explode[19]. It's detonation temperature is 282 degrees C (539 F) and it's impact sensitivity is 3 inches with a 2kg weight[20]. This stuff is extremely sensitive, and given the conditions of WTC7, not a very good explosive possibility.

Mercury Fulminate is more sensitive in all areas, heat, shock, spark, and friction, than lead azide and lead styphnate, and it is additionally sensitive to open flame[21], and because of those sensitivities it has been almost universally replaced with either. Mercury fulminate ignites at 170 degrees C (338 F)[22] and is therefore impossible to be used in any capacity in WTC7 at even the most conservative estimates.

The final primary explosive is Tetracene. Tetracene is highly sensitive to an open flame, and is slightly more sensitive to shock than mercury fulminate[23]. Tetracene will actually melt and decompose at 160 degrees C (320 F)[24]. Again, the pattern seems that primary explosives don't fare well in volatile conditions.

The next group of explosives falls under the high explosives category, secondary explosives. These are the ones people are most familiar with, such as TNT or C-4. These explosives can come in a variety of forms, from liquid to solid, and can be grains, crystals, or plastic.

Trinitrotoluene is the constituent for many explosives, meaning that some percent of the weight contains this chemical. It is commonly known as TNT. It is used in Amatol, Ammonal, Cyclotol, Torpex, Octol, Pentolite, Picratol, Tetrytol, Minol, and Tritonal among others in some degree. TNT is relatively insensitive to heat, shock, friction, and open flame. However, it is not immune to these effects. At 475 degrees C (887 F) it burns rapidly, and it can be detonated at 14 inches with a 2kg weight[20]. Additionally, it melts at a lower temperature than it explodes, 82 degrees C (178 F) and explodes at 240 degrees C (464 F)[25], and as such this and anything containing it is relatively ineffective for this purpose.

Pentaerythritol Tetranitrate, commonly referred to as PETN, is the borderline secondary explosive. It is the most sensitive of them, but much more powerful, and is the reference point for categorizing the others. It is also mixed with other chemicals, like TNT, to make other explosives, such as pentolite or semtex. It is more sensitive to shock or friction than TNT, with an impact sensitivity of six inches. It also burns at 225 degrees C (437 F)[20]. It's melting point is 142 degrees C (287 F) which causes it to decompose[26]. This is, again, way under the most conservative temperatures and force of impact to be considered seriously.

Cyclotrimethylenetrinitramine, easier to just say RDX, was invented by the British because they didn't like the sensitivity of other high explosives. Like PETN and TNT, it is used as a part of other explosives, such as Cyclotol, HBX, C-4, Torpex, and Pentolite among others. It is amazingly resilient to impact, and can even withstand small arms fire. However, a heavier weight seems to have a worse effect, causing detonation at 8 inches with a 2kg weight and burning at 260 degrees Celsius (536 F)[20]. It's melting point is also 202 degrees Celsius (395 F)[27]. The temperature at which it will ignite is 234 degrees Celsius[28], which is again lower than all estimates.

Ammonium Picrate is the least sensitive to shock and friction of all military explosives. Information is pretty sparse with this explosive, however if heated to 300 degrees C (572 F) it will explode or can be set off by shock[29]. It will also melt if it is heated to more than 122.5 degrees C (252 F)[30].

Trinitrophyenylmethylnitramine (Tetryl) is an outdated and sensitive explosive. It is mainly used as a booster explosive since it is sensitive to flame, friction, shock, or sparks. Like many explosives before it, it is too sensitive to temperature to be used in WTC7. It's melting point is 129.5 (265 F) degrees C and it's ignition temperature is 187 (386 F) degrees Celsius[31].

Just to briefly touch on plastic explosives, I'm going to take a look at C-4 and Flex-X. C-4 is made out of RDX, a few other chemicals, and a plasticizer. This makes it a pliable material. However, because it is mostly RDX, it is subject to the same problems RDX has in this situation, listed above. It is also sensitive to shock, heat, melting, and ignition. Flex-X is similar to C-4 in that it's made out of another explosives with an added plasticizer. In this case, it's again RDX, and in some cases PETN, but PETN is more rare because it's a lot more sensitive. Clearly, plastic explosives are no different in any scenario. They're often used because they are pliable and can be shaped, but they're made out of the same materials as other explosives and not any more well-equipped to deal with the extreme conditions present in those seven hours.

Finally, we get to the more popular of devices of the CT world: Incendiaries. Because there has been no evidence uncovered of explosives and because welders were used to cut the debris up for removal, pictures circulated the internet that looked like the metal was cut before it fell, and incendiaries would look similar (however, like any other explosive, these leave chemical traces as well, none have been found). Basically, an incendiary is a device used to cause a fire. Of course, many of these can burn very hot and melt through several feet of steel within minutes. The two most popular, and even in debate among the CTers, is thermite and thermate.

Thermite is nothing more than powdered aluminum and iron oxide (rust). In fact, it's not so much as a substance as it is a reaction, it can happen accidentally wherever aluminium granules make contact with rust in the proper ratio. However, the process itself isn't spontaneous (although there are reports of thermite being ignited by an oxyacetylene welder) because it takes a considerable amount of energy to ignite. That's also not to say it can't be done on purpose, and in fact has been in use since the late 1800's for welding, particularly railroad tracks, and recently military purposes. When ignited, it burns at temperatures in excess of 3000 degrees Celsius. It takes a tremendous heat source to start the reaction, around 1300 degrees C (2372 F)[32]. Thermate is very similar, made of mostly thermite, but with added chemicals that give it a higher burning temperature, flames, and a lower ignition temperature. Clearly, any ambient temperatures listed from any source were not even close enough to be considered, and since thermite/thermate are not sensitive to impact it could have survived in WTC7. More on that later.

Clearly, a vast majority of explosives simply are not up to the task. However, the explosives are just one part of a CD. There are still detonators/ignitors, and the means to employ them remotely. These too must survive the conditions.

Any modern explosive is initiated by a blasting cap. Blasting caps have remained nearly the same since their invention, with minor tweaks to make them more safe and efficient[33]. Most modern blasting caps are electric. Two insulated wires make near contact on the inside of the casing and when the charge is sent down the lines connecting the blasting cap to the operator a charge of current appears in the gap. That charge, depending on the type of cap, ignites the primary explosive or a time delay fuse. Sometimes there is another auxiliary secondary explosive inside the cap to give the blasting cap an extra kick if needed, however the initial explosive is always one of the primary ones listed above. In either case, the shockwave created by the blasting cap is what detonates the secondary explosive. There are many variations on the type of electrical blasting caps for a variety of circumstances, however they all operate on the same basic principle.

The other type of blasting cap, non-electric or shock tube detonators, work differently. Instead of a copper wire to transmit electricity, it made of several insulated, plastic tubes filled with PETN at the core. The PETN is detonated at the far end and the shockwave travels along the tube, destroying it in the process, and on to the blasting cap at the end where it transfers that shockwave into another explosive. The blasting cap, in this case, doesn't have to be filled with a primary explosive and can be filled with a more stable secondary explosive. When precision timing is necessary, it can be much more accurate because of the relatively constant travel speed of the shockwave and extraneous electricity isn't an issue[33].

What does this mean for the conditions of WTC7? In the case of non-electric detonation, it's simply not possible. The melting point and ignition temperature of PETN remains the same whether it's a charge or a tube[34], so the extreme temperatures of the building are well above what's needed to render the detonator inert or to set it off outright. The other electric blasting caps are subject to the same liability of the primary explosive found inside. Additionally, the plugs made to keep the blasting cap in working condition and hold the wires in place are typically made out of plastic or rubber and many components are soldered in place, and even made out of cardboard[35], and if those melt or burn the whole detonator could easily be inoperable. The wires that transfer the electricity to detonate the charges are only insulted with plastic, much like a wire you'd find in your house although probably a heavier gauge. Melting the insulation around a copper wire that happens to be near and make contact with any metal would ground the circuit. Additionally, since some sources point to the temperatures being at or over 1000 degrees Celsius, the melting point of copper is very near that at 1083 degrees Celsius[36]. If the wires that transfer the electricity to the blasting caps were to melt it would break the circuit. Of course, if we're getting to temperatures to melt copper the primary explosive should have detonated long before that. Thermite, which would still require a blasting cap of some kind to detonate remotely, is a bit of an exception. In most cases, thermite is ignited by heating magnesium, which acts as a booster explosive without an explosion, which has a much lower ignition temperature but burns hot enough to ignite the thermite mixture. However, magnesium ignites at 473 degrees Celsius (883 F)[37], which is well within the estimated temperatures as well. So, while the thermite would survive as stated above, the magnesium wouldn't, and neither would the detonator used to ignite the magnesium.

So, given that extensive read, what kind of conclusions can be reached from this data? First, explosives are very, very dangerous. I say this because through my research I've come across many "do-it-yourself" sites and not treating explosives with the respect they command is an egregious error. Many of them can be set off by small movements and low weights and temperatures that you can reach in your household oven. Second, CD is designed for good conditions. The tools simply don't exist to detonate a building upwards of 1000 degrees on fire being hit by tons of concrete. Very few explosives would survive seconds of being in that building, let alone seven hours, and even if they did the detonators are not made to. What you'd see if the explosives could survive the initial shock and fires isn't the neat CD the CTers claim, but an extremely unpredictable blast pattern or no detonation at all. It's my armchair demo expert opinion that it's simply not possible.

[1] http://wtc.nist.gov/pubs/factsheets/faqs_8_2006.htm see section 14
[2] http://www.fema.gov/pdf/library/fema403_ch5.pdf#search=%22fema%20report%22 see section 5.5.4
[3] http://youtube.com/results?search_query=jowenko&search=Search
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[10] http://wtc.nist.gov/pubs/factsheets/faqs_8_2006.htm see 7a and 7b
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