

**Morgan Reynolds**  
[econrn@suddenlink.net](mailto:econrn@suddenlink.net)

**March 8, 2007**

**Request for Correction by NIST for Its Invalid WTC Jetliner Animations and Analyses**

The following *Request for Correction* is being e-mailed to the National Institute of Standards and Technology on March 8, 2007. It will be certified mailed on March 9, 2007. Attorney Jerry Leaphart has informed me that he will work on additional legal papers as necessary.

March 8, 2007

VIA EMAIL AND CERTIFIED MAIL RRR  
Chief, Management and Organization Division  
National Institute of Standards and Technology  
100 Bureau Drive, Mail Stop 3220  
Gaithersburg, MD 20899-3220  
Email: [info.quality@nist.gov](mailto:info.quality@nist.gov)

Re: Request for Correction per Section 515 of Public Law 106-554

Dear Chief, Management and Organization Division:

This matter involves “information” that has been disseminated that serves a useful purpose by insuring that the completed investigation of what caused the jetliner-shaped holes in World Trade Center building numbers 1 and 2 (WTC 1, WTC 2), otherwise known as the twin towers, complies with data and information quality standards. For all of the reasons set forth below in conjunction with specific requests for correction, such

quality standards have been utterly and completely violated.

**Requester's Identity:**

This request is submitted by Morgan O. Reynolds (requester). My address, telephone number and email address are as set forth here:

Morgan O. Reynolds  
[econrn@suddenlink.net](mailto:econrn@suddenlink.net)

In addition, Attorney Jerry V. Leaphart represents me in this matter. I request that all subsequent replies be sent to both me and to my counsel whose contact information is set forth below.

**Basis for Request:**

The requests for correction of information are submitted under Section 515 of Public Law 106-554.

The particular information disseminated that is the subject of the request consists in:

**Citation for Disseminated Information and Details:**

The information is identified and known as "Final Reports of the Federal Building and Fire Investigation of the World Trade Center Disaster " <http://wtc.nist.gov/oct05NCSTAR1-2index.htm> dated as September 2005. (Also identified as Information Item No. II below).

The source from which requester obtained the information is the NIST web site at the following pages:

I.  
[http://www.nist.gov/public\\_affairs/releases/wtc\\_briefing\\_april0505.htm](http://www.nist.gov/public_affairs/releases/wtc_briefing_april0505.htm)

- II. <http://wtc.nist.gov/oct05NCSTAR1-2index.htm>
- III. <http://wtc.nist.gov/oct05NCSTAR1-5index.htm>
- IV. <http://wtc.nist.gov/NCSTAR1-5.pdf>
- V. <http://wtc.nist.gov/NCSTAR1-2.pdf>
- VI. [http://wtc.nist.gov/NCSTAR1-2B\\_Chaps1-8.pdf](http://wtc.nist.gov/NCSTAR1-2B_Chaps1-8.pdf)
- VII. [http://wtc.nist.gov/NCSTAR1-2B\\_Chaps9-11.pdf](http://wtc.nist.gov/NCSTAR1-2B_Chaps9-11.pdf)
- VIII. <http://wtc.nist.gov/NCSTAR1-6.pdf>

The jetliner animations commissioned by NIST for airplane entry, penetration and fragmentation into WTC 1 and WTC 2, as well as its computer simulations and general analysis of jetliners at the WTC, purport to show and/or demonstrate the following conditions:

1. Complete, nearly intact penetration of the jetliner image into each tower and disappearance from exterior view, nose to tail (length of the aircraft) and wingtip to wingtip (width of aircraft).
2. Nearly complete shredding and destruction of the jetliner image into small pieces inside each tower.
3. Substantial aircraft debris exiting the building via each impact hole and the wall opposite each entry hole.
4. No significant deceleration as each jetliner entered a tower.

In particular,

- a) Flight AA 11, according to NIST, hit WTC 1 flying at an estimated 443 mph yet its tail section disappeared (767 length = 159 feet) within 0.25 seconds, implying a minimum average airspeed of 434 mph traversing the initial 159 feet within the building, an insignificant drop of two percent despite massive resistance from a steel/concrete building. A real jetliner would have encountered massive steel walls and steel floor pans-trusses-reinforced concrete floors immediately, as well as the dense steel core within 60 feet, drastically slowing the jetliner.
- b) Flight UA 175 hit WTC 1, according to NIST, flying

through thin air at an estimated 542 mph yet its tail section disappeared in 0.20 seconds, implying a minimum average airspeed of 542 mph traversing the initial 159 feet inside the south tower, that is, airspeed did not decrease despite resistance by a steel/concrete building. A real jetliner would have encountered steel walls and concrete floors immediately, as well as the dense steel core within 37 feet and slowed drastically.

These purported phenomena, as mentioned above and as described by NIST and its contractors, are not independently verifiable and do not have a scientifically valid basis for making the assumption that the simulated conditions could actually have occurred. Equally significant, the preparation of simulations that depict conditions that violate scientific principles serves only to mislead and to set the conditions for false conclusions to be enunciated. That is what has transpired and that is what must be corrected, all as more fully treated hereunder.

I will briefly demonstrate this request for correction as follows:

First consider item 4 above. A jetliner must decelerate at impact due to the laws of conservation of momentum and conservation of energy.<sup>1</sup> It is no different than a human springboard diver going through air and then decelerating as he pushes against the resistance of water. A flimsy, high-speed jetliner must decelerate

---

<sup>1</sup> Conservation laws, in physics, are basic laws that maintain that the total value of certain quantities remain unchanged during a physical process. Conserved quantities include mass (or matter), energy, linear momentum, angular momentum and electric charge. The theory of relativity combines the laws of conservation of mass and of energy into a single law. Additional conservation laws have meaning only on the subatomic level. Momentum, in mechanics, is the quantity of motion of a body. The linear momentum of a body is the product of its mass and velocity. Linear momentum of a body or system of bodies are conserved if no external force acts on it or them. The change in velocity (in magnitude and/or direction) of a body with respect to time is its acceleration or deceleration. The relationship between force ( $F=mv$ ) and motion was expressed by Isaac Newton in his three laws of motion. *The Concise Columbia Encyclopedia*, Third Edition, 1994, pp. 200, 583.

sharply upon impacting a strong, massive fixed object like a skyscraper unless the jetliner acquires more energy from somewhere yet video evidence shows no deceleration of aircraft, no loss of momentum as it penetrates the tower.

NIST obviously incorporates the untested assumption that two jetliners could enter the twin towers and fail to decelerate during the first 159 feet of travel, the overall length of the jetliners. This assumption implies that all or most deceleration by each jetliner would occur within approximately the last  $208' - 159' = 49'$  in each tower, ignoring off-perpendicular lines of travel within a tower. The endpoints maintained by NIST are impossible (entry at 443 or 542 mph with average speed maintained for 159' in each tower, followed by deceleration to zero for most of each jetliner within the remaining approximately 49'). If kinetic energy and/or momentum did not decrease during the first 159' of tower penetration (implied by no deceleration), then each jetliner would have exited its tower, flying right through. It would be like a .357 magnum bullet fired through paper or 1 mm of balsa wood. As any such theory about jetliner impact with the twin towers is physically impossible, it is utterly improper for NIST and the supposedly sophisticated contractors it retained and paid to have utilized patently false physics so as to disregard the issue of deceleration as here shown to have been done.

All videos that “record” penetration by UA 175 into the south tower show no collision/crash and no deceleration. Instead, the jetliner image is “absorbed” by the building without deceleration; we just see a jetliner image glide into the tower and disappear without losing a flap, panel, wing tip or tail section.

Many of the available depictions of WTC 2 even show apparent “healing” of the structure as the jetliner penetrates. Some images show, for example, no break in the wall (no “scar” or column failure) after the wing section between the engine and fuselage passes into the building. The same impossible healing is true of the entire impact area.

As the conditions shown in such videos obviously violate several laws of physics, of momentum and of energy, to such an obvious

extent that professionals like those employed and hired by NIST must be deemed to know this, it follows that the information thus far disseminated to the public, and mentioned herein, is false, fraudulent and cannot be allowed to remain as is.

Videos that depict such impossibilities must be deemed to involve special effects of some kind for they almost certainly constitute fake “evidence” that should have been identified as such by a proper review of that information in the normal process of engaging in scientific “due diligence” that must be and is a prerequisite for issuance of reports that comport with the requirements of “data and information quality.”

The assumptions concerning the laws of physics that are incorporated into the videos, as seen, are simply based upon impossible physics, rather like a “Road Runner” or “Tom & Jerry” cartoon. The analogy is both exact and obvious and should have been spotted. In addition, features like noiseless penetration of the towers despite noisy jet engines and other sounds on audio portions (screaming, etc.) prove fakery.

NIST violates quality standards by relying on fraudulent evidence and positing phenomena that violate elementary physics. NIST apparently failed to interview and document the photographers of each video, chains of custody (e.g., the Evan Fairbanks video allegedly was in the hands of the FBI on 9/11 for several hours and only a portion of the video was returned) and failed to investigate to insure no manipulation of pixels. For unknown reasons, NIST relied on obviously fraudulent data (e.g., faked videos) for its “analysis.” If NIST engaged in conscious fraud, as is likely, the British would call it “fixing the intelligence to fit the policy.”

Next, consider items 1-2 above. An aluminum jetliner cannot be invincible in one instant and fragile in the next instant, despite the proposed “creative” physics of NIST. Physics rejects any theory that posits an invincible jetliner (a jetliner remaining intact after an abrupt collision with a massive steel/concrete skyscraper) but also disintegrates (flimsy) in the next instant in the same general physical environment (temperature, etc.). An aluminum jetliner cannot push through steel walls, steel-reinforced concrete floors,

and a steel core of 47 cross-braced steel columns and disappear yet suddenly turn into shredded aluminum and other shredded materials. Yet the conditions here referenced are precisely those that are presupposed in, relied upon and/or incorporated into NIST findings and simulations referenced in this request for correction.

Virtually intact penetration is impossible because an aluminum jetliner is light and fragile and is not built to survive collisions with hundreds of thousands of tons of steel and concrete. Collisions are a matter of relative speeds—neither the jetliner nor the building “knows” which one is moving at 500+ mph and which one is standing still. Imagine that a WTC tower toppled over and into a Boeing 767 parked on the ground. What would happen? Despite slow speed of the tower, far below 500 mph, the “localized” area of the tower would crush the Boeing and the aircraft, in turn, would inflict little damage on the building. The difference is the vast discrepancy in mass of the two bodies.

Gashes in the towers, in addition, were too small to completely absorb the alleged aircraft. A Boeing 767 has a wingspan of 156 feet, wider than the gashes in either tower, about 126 feet at WTC 1 and 106 feet at WTC 2. Gash heights were short of the 45+ feet necessary to swallow a 767 tail section. To accommodate this problem, NIST relies on a “shredding” theory. NIST finds that the 767 fuselage (essentially a hollow aluminum tube), fuel-laden wings and engines caused complete failure of the steel walls (and floors) while the outer half of the wings damaged wall columns and belts but these wall sections did not fail. Allegedly the outer wings “shredded” against a web of steel and all wing material was carried into the buildings. This is impossible, as demonstrated here (“A Theoretical Shredding Mechanism” section in [http://nomoregames.net/index.php?page=911&subpage1=we\\_have\\_holes](http://nomoregames.net/index.php?page=911&subpage1=we_have_holes)). Steel wall sections that do not fail (fragment completely) would compress the wing, causing crumpling in the wing. Tearing must occur some distance from the steel columns and spandrel belts against which the jetliner metal crumples up. Barring any angular forces arising to spin pieces around columns and spandrel belts, all steel columns, steel spandrel belt and floor sections that were hit at the wall but did not fail must have rejected jetliner pieces and bounced them outside each tower. We would expect

even more debris compared to a fracture mechanism because shredding would hold back a considerable amount of material in large crumpled pieces rather than shattered fragments. Yet pictures and videos show no aircraft debris fell to the ground below the impact zones. Where is the evidence for the shredded wing halves? It does not exist. They could not have flown into the buildings after reflection by steel walls.

Item 3 is false since there was no aircraft debris showering down below the impact zone. Videos of the “glide-ins” and still pictures below the gashes support this conclusion. Nor is jetliner debris visible in the two gashes themselves. Nor has NIST or any other official investigation agency produced a single time-change part with its unique serial number from any of the alleged commercial aircraft of 9/11 matched against each aircraft’s maintenance log to prove aircraft identity. Such identification is standard practice in aviation accidents and disasters. Further, thousands of pounds of jetliner debris posited by simulations supposedly located in the WTC plaza are unproven too.

The following quotations from NIST documents support the Request for Correction:

From V: “The aircraft impact response was dominated by the impact, penetration, and fragmentation of the airframe structures. The entire aircraft fully penetrated the tower at approximately 0.25 s.” p. lxxiv.

“The wing structures were completely fragmented by the exterior wall...The aircraft was severely broken into debris as a result of the impact with the tower. At the end of the impact analysis, the aircraft was broke into thousands of debris fragments of various sizes and masses. Larger fragments still existed for specific components, such as the engines...” p. lxxvi

IV: "The speed of American Airlines Flight 11 as it entered the tower was estimated at 683 ft/s+/- 50 ft/s, or 466 mph +/- 34 mph." p. 9

On the same page, Table 2-1: “0.00 seconds Plane enters tower...0.20 seconds Tail disappeared into building.”  
[Disappearance of a Boeing 767 within one-fifth of a second implies an average airspeed in the building of 542 mph, so NIST here implies that the alleged Flight 11 flew at 466 mph in thin air and then sped up by 76 mph to 542 mph in the steel/concrete north tower. This is impossible.]

V: Exec summary shows impact speeds of 443 +/- 30 mph for AA 11 and 542 +/-24 for UA 175, p. lxxiii.

VI: “A 500 mph engine impact against an exterior wall panel resulted in a penetration of the exterior wall and failure of impacted exterior columns. If the engine did not impact a floor slab, the majority of the engine core would remain intact through the exterior wall penetration, with a reduction in speed between 10 percent and 20 percent.” p. xviii.

[Comment: A jet engine like a P&W is a dense 5-6 tons made of stainless steel, titanium and other materials, and allegedly such engines powered a 767 at 500+ mph into WTC 2 and at approximately 466 (or 443) mph into WTC 1. An engine would be the least likely item aboard to slow down since fuselage, wings and tail sections would necessarily encounter floor slabs while engines need not. The engines presumably were at or near full power. Under power, the engines would be the last items to decelerate. A proposed 10-20% deceleration of engines contradicts the NIST overall conclusion of no-deceleration established above. NIST “logic” once again fails mandated quality standards].

VI: The holes shown by NIST are undersized, that is, too small to absorb a 767 intact. Pp. lxxi-lxxii and lxxviii.

V. “...The aircraft impact on WTC 1...the exterior columns were not completely failed in the outer wing and vertical stabilizer impact regions.” p. xciii.

“Damage to the exterior wall extended to the wing tips, but the

exterior columns were not completely failed in the outer wing and vertical stabilizer impact regions.” xciii

“The analyses indicated that the wing structures were completely fragmented due to the interaction with the exterior wall, and as a result, aircraft fuel was dispersed on multiple floors.” p. cxi

“The residual kinetic energy in the airframe components at the termination of the global impact simulation was less than one percent of the initial kinetic energy at impact.” P. 173 (p. 287 of 462).

[Comment: This statement implies termination within 208’ despite little or no deceleration over the first 159+ feet. So these jetliners supposedly stopped in less than 50 feet at approximately 443 and 542 mph. Truly amazing!].

“The forward fuselage structures were severely damaged both from the penetration through the exterior columns and the interaction with the 96<sup>th</sup> floor slab that sliced the fuselage structures in half.” P. 173 (p. 287 of 462).

[Comment: yet no fuselage was visible in the gash or below the impact zone].

“By 0.2 s after impact, the wings completely penetrated the exterior wall, and only the tail structures were outside the tower...The wing structures were completely fragmented by the penetration through the exterior wall...” P. 173 (p. 287 of 462).

[Comment: now full penetration at WTC 1 purportedly was completed at 0.25s instead of 0.20s].

Figure 7-4 “Entire aircraft inside tower at 0.24-.25 with 30 percent of initial momentum” for WTC 1 base case impact. P. 178 (p. 292 of 462).

[Comment: loss of 70 percent of momentum during initial 159 feet contradicts no deceleration during disappearance of entire aircraft inside tower.].

“The calculated debris cloud included 17,400 lbs of debris and 6,700 lbs of aircraft fuel outside of the tower at the end of the impact analysis, either rebounding from the impact face (north wall) or passing through the tower (south wall).” P. 190 (p. 304 of 462).

“By 0.2 s after impact, the full penetration of the aircraft into the tower was just completed...The airframe was mostly broken up, but some large sections of the aft fuselage and tail were still intact, having penetrated through the opening in the south wall produced by the forward fuselage structures.” P. 219 (p. 333 of 462).

Figure 7-35. “Normalized aircraft momentum for the WTC 2 base case impact” [entire aircraft inside tower at 0.2 s]. P. 224 (p. 338 of 462).

[Comment: loss of 70 percent of momentum during initial 159 feet contradicts no deceleration during disappearance of entire aircraft inside tower.]

“Total aircraft debris outside tower: 55,800 lb, base case WTC 2 impact.” P. 241 (p. 355 of 462).

[Comment: Neither NIST nor anyone else offers evidence of this phenomenon.]

“Aircraft debris total outside tower for the more severe WTC 2 impact: 121,000 lb.” P. 258 (p. 372 of 462)

Fig. 7-70. “Landing gear (picture) found embedded in exterior panel knocked free from WTC 1.” P. 274 (p. 388 of 462).

“The aircraft impact on WTC 1 resulted in extensive damage to the north wall of the tower, which failed in the regions of the fuselage, engine, and fuel-filled wing section impacts. Damage to the exterior wall extended to the wing tips, but the exterior columns were not completely failed in the outer wing and vertical stabilizer

impact regions.” P. 303 (p. 417 of 462). )  
[The NIST Report claims ditto for the aircraft impact on WTC 2] .

Appendix E, p. 340+ (p. 454 of 462):

WTC 1 videos (n=2):

The first is the Naudet brothers

The second WTC 1 impact video is from Pavel Hlavel 2001. All rights reserved]. P. 340 (p. 454 of 462).

WTC 2 videos (n=7):

p. 341 jetliner looks black, shaped like a 747, WABC-TV

p. 342 Michael Hezarkhan, looks like CNN shot, looks like AA livery, fuselage nose in WTC 2

p. 343 Park Foreman, very dark aircraft, darker than UA livery, with two shiny spots on starboard fuselage

p. 344 Scott Myers, AA livery with jetliner nearly overhead to left, on Liberty St. or block south of Liberty?

p. 345 Evans Fairbanks with jetliner overhead of FBI agent?

p. 346 WNBC jetliner seen from north

p. 347 WPIX-TV NYC “fractional” jetliner seen from east?, very dark, sun doesn’t shine on it, wings and engines look amiss, wrong angle

VII. Landing gear at West and Rector found at the corner of West and Rector streets Figure 9-122 (Picture).

“Modeling uncertainties may also have contributed to the inability to predict the trajectory of specific aircraft components.” P. 345 (p. 161 of 208).

[Comment: this landing gear is fabricated evidence just as proven here for the landing gear at Murray and Church streets:

[http://nomoregames.net/index.php?page=911&subpage1=trouble\\_with\\_jones#NBB](http://nomoregames.net/index.php?page=911&subpage1=trouble_with_jones#NBB)].

**How Disseminated Information was obtained:**

Requester obtained the information from and after March 1, 2007 from the said web pages and pdfs. It is understood and acknowledged that said information has been disseminated since September 2005. The data and analyses offered regarding jetliners impacting the twin towers are seriously impaired and misleading. This requires, at a minimum, the corrections set forth and requested hereunder.

### **Explanation of how Requester Is affected:**

Requester submits this request on behalf of himself and other similarly situated persons. Requester is a citizen of the United States, a professor emeritus and maintains a web site <http://nomoregames.net> for the accurate analysis and dissemination of information about the events of 9/11. Requester's business is in the nature of a research and educational enterprise that has succeeded in providing citizens of the United States with information concerning the function and the operation of various governmental agencies that are charged by their enabling legislation, rules and regulations of conducting certain duties in and for the public interest, of which and about which each citizen has a vital interest.

As indicated, this request is to be understood as being submitted by requester in his said capacity and either additionally or alternatively on behalf of other similarly situated persons who are too numerous to quantify or specifically name. Requester is adversely affected by the ongoing threat of promulgation of information that is in need of correction because the present course of action may result in the further concealment of serious wrongdoing. Requester is an "original source" of the analysis presented herein that demonstrates that false and misleading information has been presented as being accurate when plainly it is not.

Specifically, Information Item Nos. 1-4 fail to comply with applicable information quality guidelines and standards in a number of particular ways, including but not limited to the physical principles, facts and arguments stated above.

Requester asserts that the quoted information is demonstrably false and misleading and must be corrected, together with other information that, at present, also contains false and misleading statements.

By copy of this Correction Request to my counsel, Jerry V. Leaphart and Associates, P.C., I hereby request that he file such other and further requests for relief as may be suitable based on the original source information submitted herein.

Respectfully submitted,

Morgan O. Reynolds

Cc

Jerry V. Leaphart  
8 West Street  
Suite 203  
Danbury, CT 06810

Addendum:

ARA, as described below, appears to have been the principal contractor responsible for NIST aircraft impact analysis, as well as a current contractor for analysis of the destruction of WTC 7:

[http://wtc.nist.gov/solicitations/wtc\\_awardQ0334.htm](http://wtc.nist.gov/solicitations/wtc_awardQ0334.htm)

**Contracts**

**Awards**

Under solicitation number SB1341-03-Q-0334, an indefinite deliverable, indefinite quantity (IDIQ) purchase order has been awarded to APPLIED RESEARCH ASSOCIATES, INC. (ARA) of Albuquerque, New Mexico:

ARA is an engineering firm that specializes in the following areas: nonlinear structural dynamics under blast and impact loading, vehicle crashworthiness and impact behavior, aircraft impact analysis, dynamic fracture modeling and failure analysis, impact and penetration mechanics, probabilistic engineering mechanics, and structural engineering. ARA is well qualified to conduct the analysis of the aircraft impact into the WTC towers with active research programs in crash, impact, and blast damage of structures for over 20 years. ARA is selected by the Federal Highway Administration as a Center of Excellence in finite element crash analyses and is designated by Livermore Software Technology Corporation (the developer of the LS-DYNA software package) as a Research Collaborator. Specific examples of the team's past work include:

- Analysis of aircraft impact into nuclear power plant containment structures and storage containers.
- Analysis of a fighter aircraft impact into multiple reinforced concrete barriers.
- Fragmentation of aircraft components due to turbine rotor failure.
- Simulation of railcars in high-speed impacts.
- Studies of the effects of blast on buildings and their progressive collapse.

The specific tasks that ARA will perform include:

- 1) Provide estimates of the damage to structural systems due to aircraft impact – including exterior walls, floor systems, and interior core columns.
- 2) Provide estimates of the aircraft fuel dispersal during the impact.
- 3) Provide estimates and contours of accelerations and deformations as a function of time in each of the two towers due to aircraft impact to be used for estimating damage to fire proofing.
- 4) Provide a database of the major fragments of the aircraft and destroyed structural components of the towers to be used for estimating damage to the mechanical and architectural systems inside the towers.

The impact analyses will be conducted at various levels including: (1) the component level, (2) the subassembly level, and (3) the global level to estimate the probable damage to the towers due to aircraft impact. The analyses will also include simplified and approximate methods. Analysis of uncertainties using the component, subassembly, global, and simplified

analyses will also be conducted to assess the effect of uncertainties associated with various parameters on the damage estimates.

The team from ARA combines engineers from several branches of ARA with diverse background and experience in crashworthiness, dynamic fracture analysis, applied mechanics and nonlinear dynamics, probabilistic mechanics, constitutive modeling, and structural engineering. The team is led by the three engineers with relevant backgrounds and appropriate knowledge in impact and crashworthiness studies. Select experience of these key project personnel is summarized below:

- Dr. Steven W. Kirkpatrick is the program manager for this project. Dr. Kirkpatrick is a senior engineer with 19 years of experience in vehicle crashworthiness, structural dynamics, finite element analysis, impact and penetration mechanics, and failure analysis. He has more than 80 publications in these areas. His research experience includes a wide range of government and commercial projects for rail, highway, civil, military, and aerospace applications. He has been a program leader for many studies requiring close collaboration between experimental and computational efforts with emphasis on model validation. Dr. Kirkpatrick has a doctorate in mechanical engineering from Stanford University.
- Dr. B. Samuel Holmes is the program supervisor for this project. Dr. Holmes is a principal engineer with 40 years of experience in vehicle crashworthiness, structural dynamics, failure analysis, and fluid mechanics. He has served as a program manager and group leader for a variety of projects combining analysis and experiments. He acted as principal investigator for studies of train crashworthiness and the design of a crashworthy locomotive cab, and automobile accidents including compatibility and structural design for high speed impact, train aerodynamics, and impact. His experience also includes studies of weapons and blast effects on large structures. He has more than 40 publications in these areas. Dr. Holmes has a doctorate in applied mechanics from Drexel University.
- Dr. Justin Wu is the technical lead in performing the uncertainty analysis of this project. Dr. Wu is the director of probabilistic engineering at ARA. He is a renowned expert in probabilistic methods with 20 years of experience in the development and application of innovative physics-based probabilistic methods for a wide range of applications including structural reliability analysis and design of space shuttle, aircraft, offshore pipeline, power plant, and automotive; nuclear waste repository risk assessment, and hard target uncertainty analysis. Dr. Wu heads the development of ARA's ProFES (Probabilistic Function Evaluation System) software package, previously supported by the Air Force and NASA. He also leads the development of methodologies and software

tools for hard target uncertainty analysis for DTRA, reliability-based multi-disciplinary design for NASA, and rotorcraft probabilistic damage tolerance analysis for FAA. He has more than 100 publications. Dr. Wu has a doctorate in mechanical engineering from University of Arizona.

Other key ARA team members include:

- Dr. Robert Bocchieri, Senior engineer, will provide expertise in constitutive modeling, rate-dependent material behavior, fracture mechanics and failure analysis, finite element analysis, structural dynamics, and crashworthiness. Dr. Bocchieri has a doctorate in aerospace engineering from the University of Texas at Austin.
- Dr. Lawrence A. Twisdale, Principal Engineer/Scientist, will provide expertise in structural engineering and building performance. Dr. Twisdale is a licensed professional engineer and has a doctorate in civil engineering from the University of Illinois.
- Mr. Robert Frank, Principal Engineer/Scientist, will provide expertise in structural mechanics, structural dynamics, finite element analysis, and development and application of simplified response models. Mr. Frank is a licensed professional engineer and has a Master of Science degree in civil engineering from the Massachusetts Institute of Technology.

In addition, the ARA team is augmented by the following experts:

- Dr. P. V. Banavalkar, President of Ingenium Inc., will provide expertise in the analysis and behavior of high-rise steel structures. Dr. Banavalkar has over 40 years of project experience and ten of his building designs are listed in "100 of the World's Tallest Buildings" published in 1998 by the Council of Tall Buildings and Urban Habitat. His experience includes design for all conditions including critical seismic regions, blast-resisting structures and systems for prevention of progressive collapse. His notable projects include Library Tower in Los Angeles, Fountain Place in Dallas, Chase Tower in Houston, and U. S. Bank Place in Minneapolis. As a leading expert in his field, Dr. Banavalkar has authored more than 40 publications and lectured extensively on subjects such as steel structures, seismic stress, and concrete. Dr. Banavalkar is a licensed professional engineer and has a doctorate in civil engineering from Cornell University.

- Dr. Matthew H. Koebbe, independent consultant, will provide expertise in finite element modeling and automatic mesh generation, and nonlinear dynamics. Dr. Koebbe has a doctorate in Mathematics from the University of California, Santa Cruz.

<http://wtc.nist.gov/solicitations/>

## Contracts

For more information, contact Joan Smith, 301-975-6458, [joan.smith@nist.gov](mailto:joan.smith@nist.gov) and Mike Szwed, 301-975-6330, [michael.szwed@nist.gov](mailto:michael.szwed@nist.gov).

- [Detailed description of the selection process for external experts and contractors \(New\)](#)
- [Subscribe to the WTC mail list to receive notification on new contract solicitation postings and awards](#)

## Awards

11

[SB1341-03-Q-0334](#)

R -- Analysis of Aircraft Impacts Into the World Trade Center Towers

Applied Research Associates, Inc. (ARA)

9/23/2003

[Award Information](#)

17

[SB1341-06-Q-0186](#)

R - World Trade Center 7 Structural Models and Collapse Hypothesis

Applied Research Associates

3/31/2006

[Award Information](#)