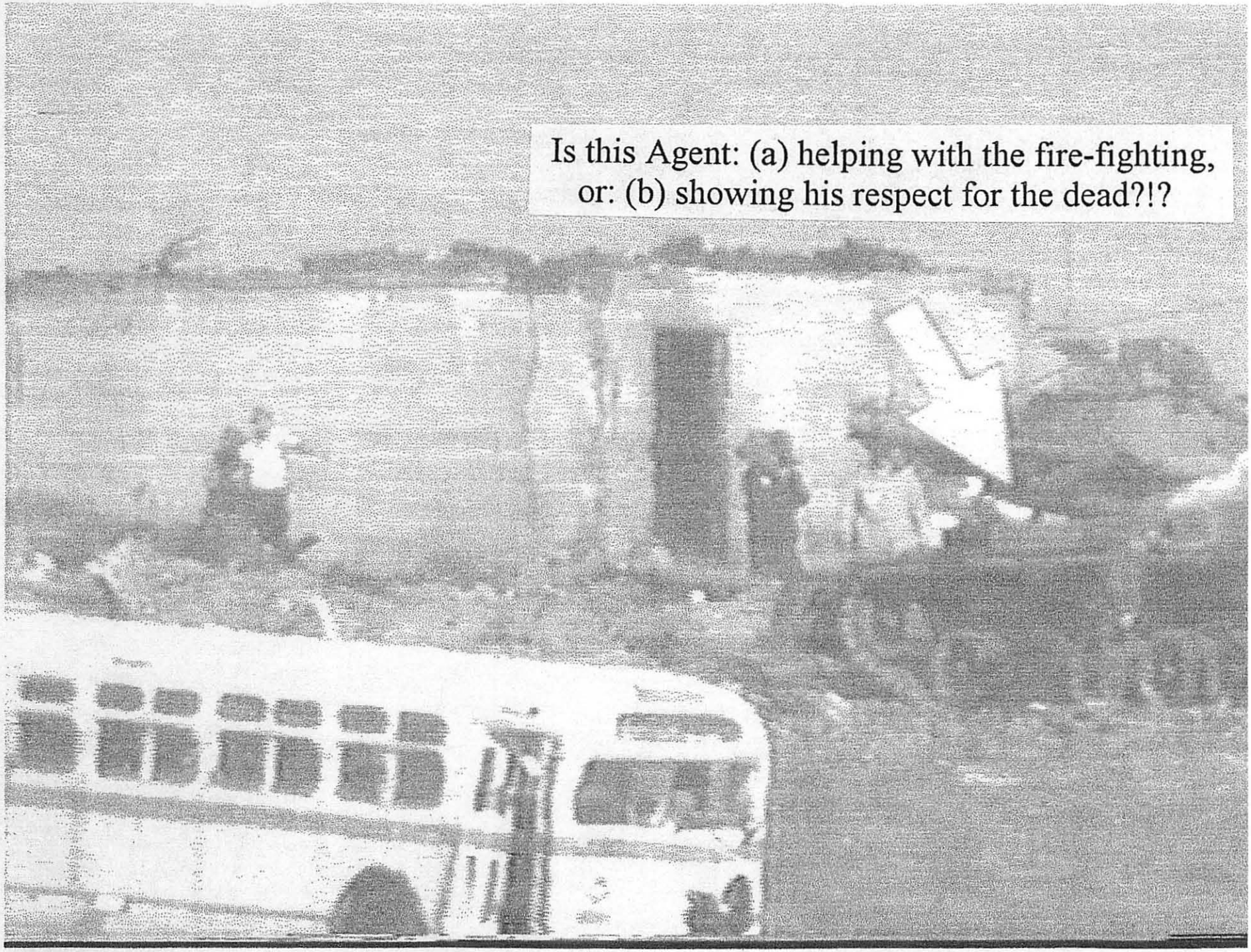
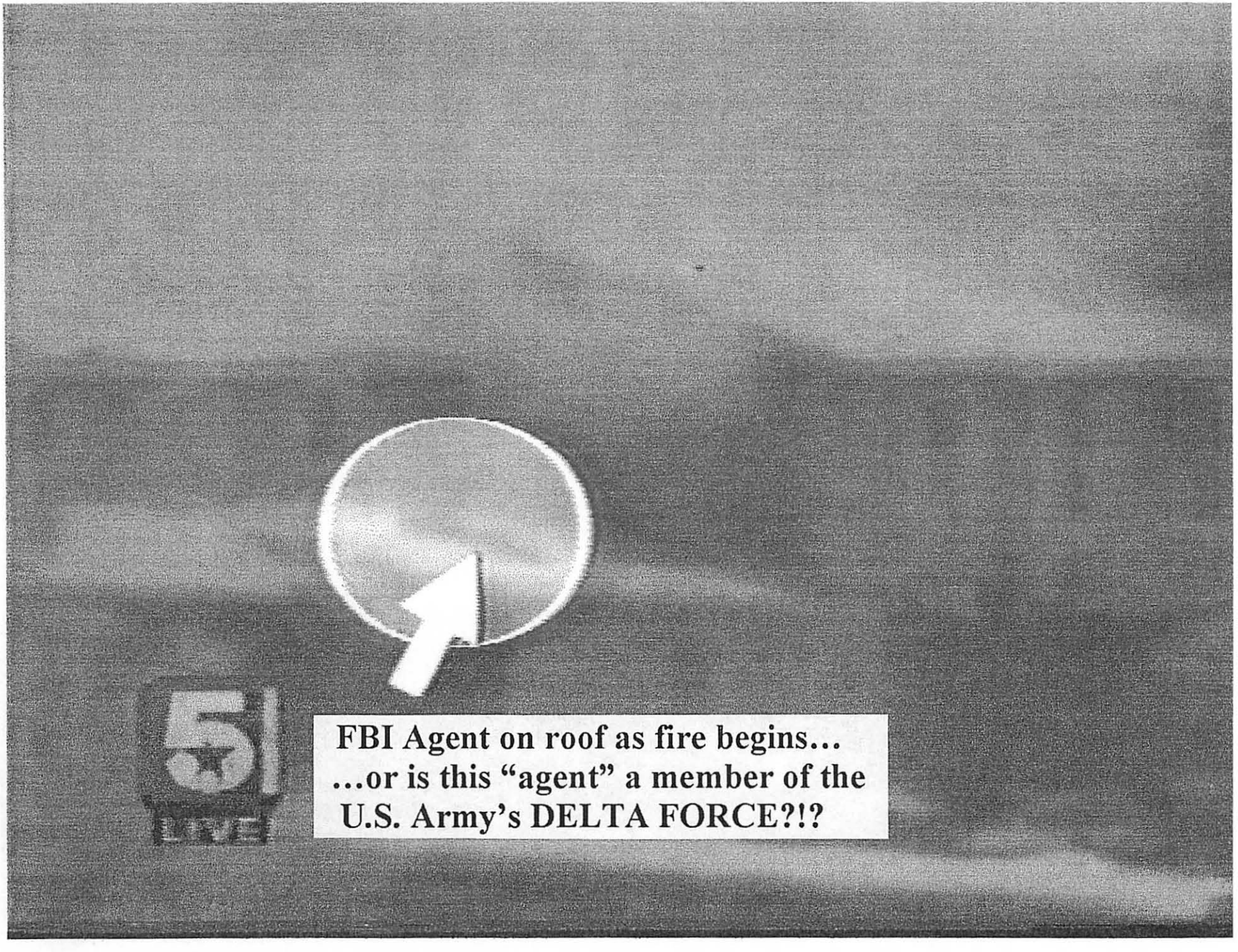
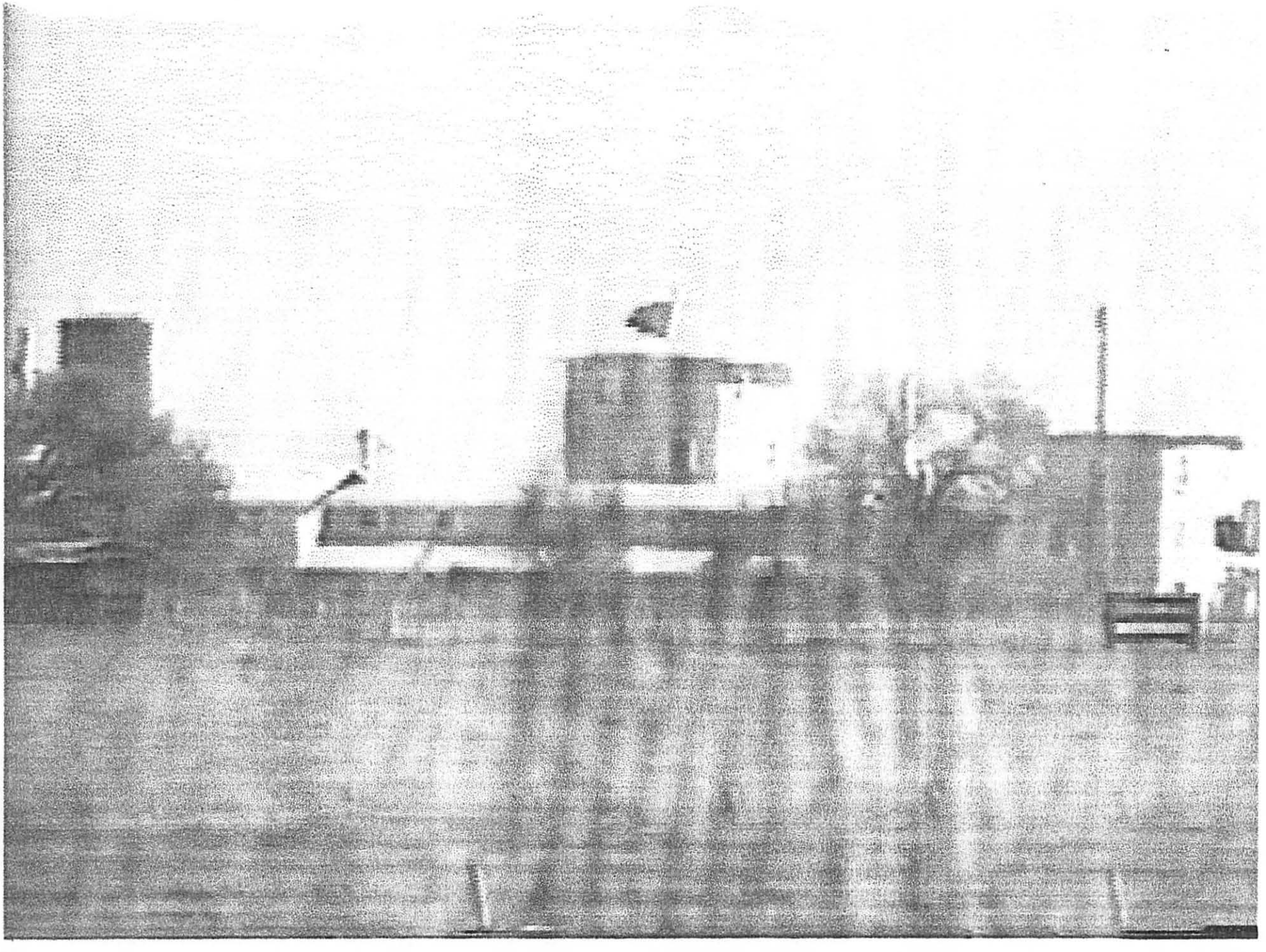

Is this Agent: (a) helping with the fire-fighting,
or: (b) showing his respect for the dead?!?

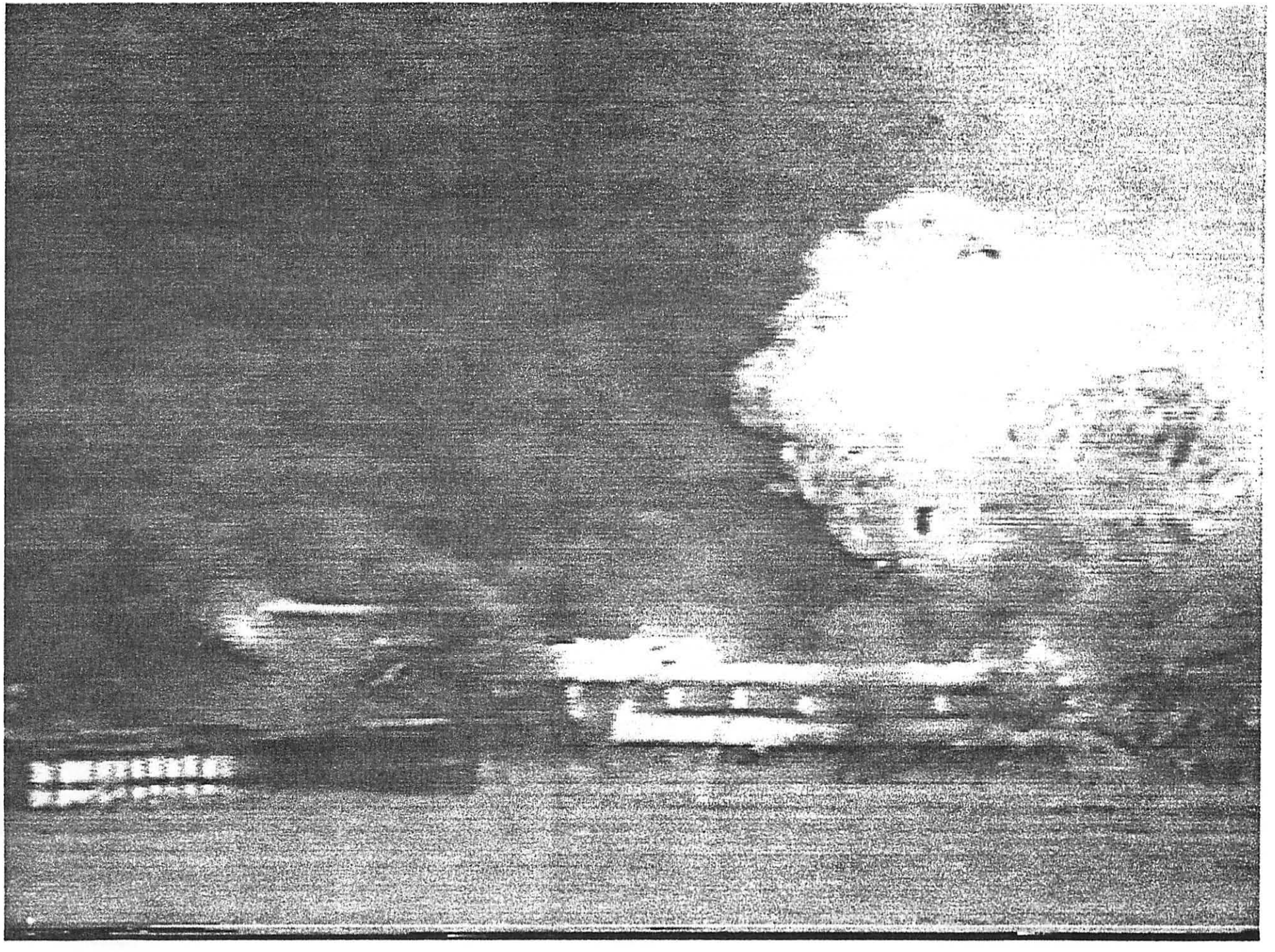

5
LIVE
FBI Agent on roof as fire begins…
…or is this "agent" a member of the
U.S. Army's DELTA FORCE?!?

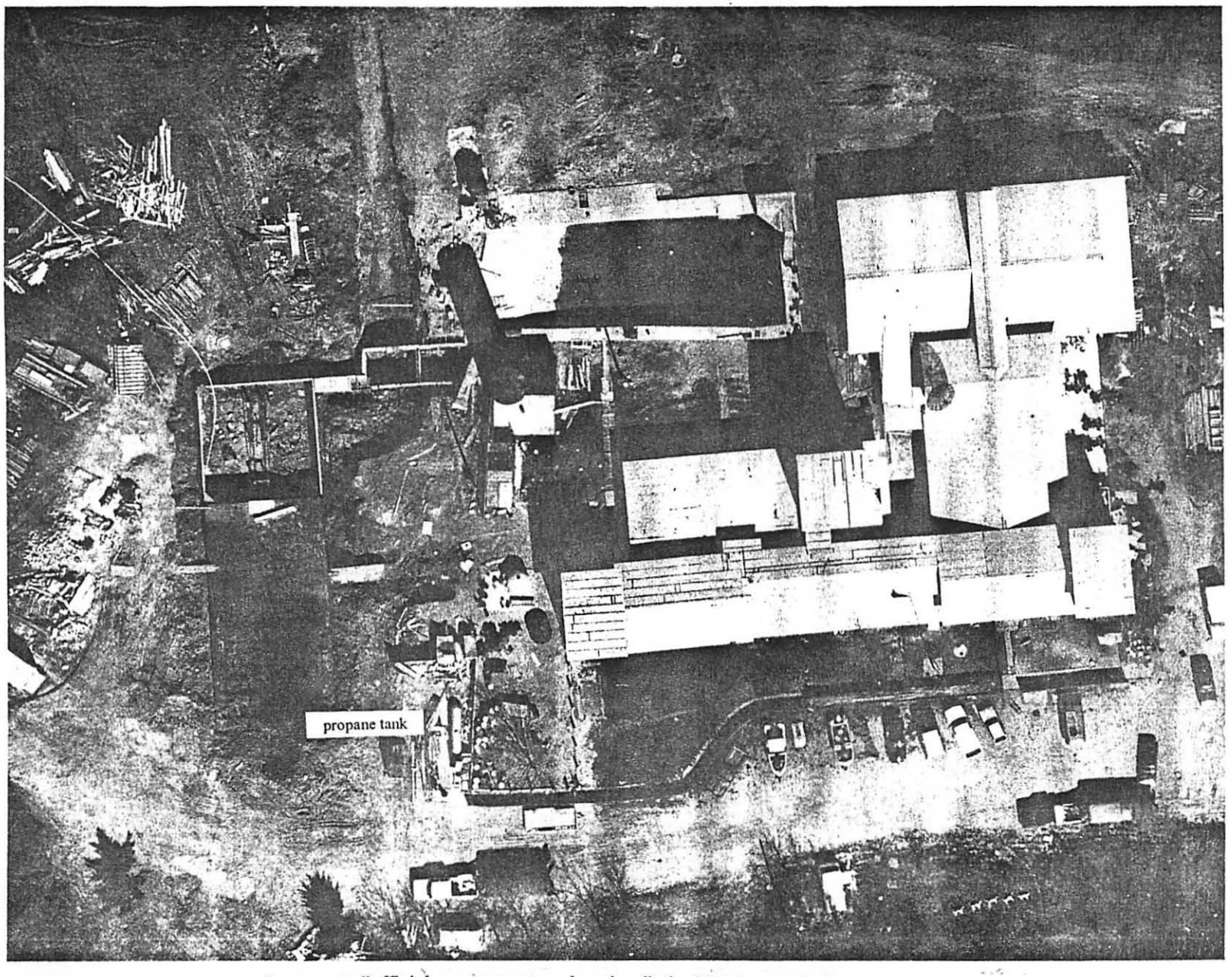
LIVE


5
LIVE

This tank, assaulting the rear of the gymnasium, completely enters the gymnasium for 30 seconds, then backs out. This same maneuver is repeated again, approximately 36 seconds later. Again, for 30 seconds the tank is completely inside the gymnasium (and away from the only witness- the FLIR video camera). This is the point of entry for the Delta Force Team, which murdered Davidians and started the fire to conceal damaging evidence against the government. (The following 3 FLIR images show the first penetration)







Contrary to "official government explanations", the 12:26pm explosion was NOT the result of the propane tank exploding. This photo shows the position of the propane tank – on the other side of the building. Explosion seems to be in the Chapel area – NOT over the Church Records Vault, where the women and children were hiding.

U.S. TREASURY DEPARTMENT
BUREAU OF ALCOHOL, TOBACCO & FIREARMS

PAUL C. GRAY
ARSON INVESTIGATOR

16630 IMPERIAL VALLEY DRIVE
SUITE 251
HOUSTON, TEXAS 77060

(713) 229-3879

Ans. Service After 6 PM 229-3504

TRANSCRIPT OF "BUGGED" CONVERSATIONS THE MORNING OF THE FIRE

09B-SA-38851
SA 73-2
DAY 2
DATE 4/19/93

KORESH - DAVID KORESH
S - STEPHEN SCHNEIDER
S/A SAGE - BYRON SAGE
UM - UNKNOWN MALE
UM (S) - UNKNOWN MALE (POSSIBLY STEPHEN SCHNEIDER)
UF - UNKNOWN FEMALE
C - CHILD
UI - UNINTELLIGIBLE

Time		
0556		(telephone ringing)
	UM:	Hello...hello
	S/A SAGE:	Hello, is Steven there?
	UM:	I can hardly hear you
	S/A SAGE:	Is (ui) there?
	UM:	Uh, no he's asleep right now
	S/A SAGE:	Wake him up...this is Byron Sage, it's a very important call.
	UM:	Ah...no sir, he asked not to be bothered now. He really had a very (ui) day..(long pause)...I'm gonna go check again, ok? Hold on (ui).
		(pause, background noises, whistling sound, tanks moving)
		(UI conversation)
0600	UM (S):	Hello, yes, I can hardly hear you
	S/A SAGE:	Hear now?
	UM:	very weakly
	S/A SAGE:	Ok, this is Byron Sage. I'm going to advise you of something that's very important.
	UM:	Ok...I'm glad I can hear you

EXHIBIT D

S/A SAGE: Ok, we're in the process of putting in tear gas into the building. This is not an assault. We are not entering the building, not an assault.

S: You are going to spray tear gas into the building.

S/A SAGE: In the building...we are not entering the building. This is not an assault.

UM: Tear gas (ui).

S/A SAGE: Don not fire your weapons. If you fire, fire will be returned.

UM (S): Everybody grab your masks, everybody grab your masks.

(sound of shuffling around; popping/clicking noises - possibly the sound of rounds being chambered into weapons)

(UI conversation)

S/A SAGE: (ui) inside the Branch Davidian compound. We are in the process of spraying tear gas into the building. This is not an assault. This is not an assault. We will not be entering the building; this is not an assault; do not under any circumstances discharge the weapons. If you fire, fire will be returned. Do not shoot, this is not an assault.

UM: you all up

UM: (ui) tear gas in the building.

S/A SAGE: It's a non-lethal...(ui) it will temporarily render the building uninhabitable. Exit the compound now and follow instructions. (ui) You are not to have anyone in the tower. The tower is off limits. No one is (ui) the tower.

UM: (ui) shootin' at him.

B: The tower...

0601 UM (S): Everybody wake up...let's start to pray (ui)

S/A SAGE: Dealt with accordingly, come out now - you will not be harmed, follow all instructions, come out of the compound with your hands up - carrying nothing. Come out of the compound with your hads up, carrying nothing. Come out of the building and walk up the driveway toward Double Ranch Road. Walk toward the large red cross flag. Follow all instructions of the FBI Agents in the Bradley vehicles.

(clicking sounds - possibly loading a weapon)

S/A SAGE: Follow all instructions, you are under arrest. This standoff is over. We do not want anyone hurt.

UM: Where's Steve? Steve down here?

UM: (ui)

S/A SAGE: Follow all instructions.

UM: We have to make out (ui).

S/A SAGE: Do not, do not fire any weapons. We do not want anyone hurt.

UM: (ui) the phone.

S/A SAGE: The gas will continue to be delivered until everyone is safely out of the building.

UN: Get any (ui)?

UM: Yeah.

S/A SAGE: Exit the compound now. (ui) Those of you remaining inside the Branch Davidian complex (ui) proper authorities. We do not want anyone (ui). Follow all instructions. This
0605 is not an assault

UM: What number you got on 'em?

S/A SAGE: Do not discharge any weapons.

UM: (ui)

S/A SAGE: The gas will continue to be delivered until everyone is out of the building.

UM: (ui) bad (ui).

S/A SAGE: Exit the compound now. You are advised there is to be no one in tower, the tower is off limits. Be advised that the tower is off limits. No one is to be in the tower. Anyone observed in the tower will be considered to be an act of aggression and will be dealt with accordingly.

(Thumping sound)

UM: Am I gonna hear him?

UM: let me do that

(UI conversation)

UM: Come on.

UM: (ui) you can't get a (ui).

UM: One? Right here.

UM: You want it poured?

(thumping sound)

S/A SAGE: (ui) the tower is off limits, no one is to be in the tower. If you are observed in the tower (ui). Come out now and you will not be harmed.

UM: (ui)

S/A SAGE: carrying nothing. Come out of the building and walk up to (ui)

UM: They're hitting the building. Whoa

S/A SAGE: Follow all instructions (ui) Bradley. Follow all instructions. You are under arrest. We do not want anyone hurt. Follow all instructions.

UM: Pablo, have you poured it yet?

UM: Huh?

UM: Have you poured it yet?

UM: In the hallway.

UM: Things are poured. Right? (ui)

S/A SAGE: Do not, do not fire any weapons.

UM: Need to get the fuel out.

S/A SAGE: We do not want anyone hurt.

UM: Do you want me to pour it already?

UM: We want the fuel.

S/A SAGE: The gas will continue to be delivered until all...

UM: You want some here?

S/A SAGE: Are out of the building. Come out now.

UF: I need a gas mask.

CHILKORESH: I need a gas mask.

UM: Got any fuel?

UM: We need fuel.

UM: Fuel, over here.

UM: Is that (ui)?

UN: Fuel.

(sound of tanks)

0610 KORESH: You got a mask up here?

UM: (ui) there are no more.

UM: You need to stop the tear gas.

UM: Okay Pablo.

(popping sounds)

UM: Don't pour it all out, we might need some later.

UM: (ui) throw the tear gas back out.

UM: Tear gas (ui).

UM: Big bang?

UM: Don't fire (ui).

S/A SAGE: (ui) tear gas will be (ui) at this time (ui) the building (ui) fire, you will be fired on. This is not an assault. The gas you will smell is non-lethal tear gas. (ui) Exit the compound now. Exit the compound now and follow instructions. You are not to have anyone in the tower. No one is to be allowed in the tower. Anyone in the tower is considered to be an act of aggression.

UM: Can we put out the lights?

UM: No

UM: Did somebody ask?

S/A SAGE: If you come out now you will not be harmed. Follow all instructions. Come out with your hands up, carrying nothing.

UM: They're comin' in, they're breaking the building down.

UF: Would you get (ui) gas mask?

UM: (ui)

UM: (ui) baking it.

S/A SAGE: You are under arrest.

UM: (ui) as long as I can.

S/A SAGE: We don't want anyone hurt.

UM: They're punching walls in.

S/A SAGE: No one in the (ui).

UM: (ui), hey, hey.

S/A SAGE: This is not an assault. Do not fire any weapons. Do not fire any weapons. We do not want anyone hurt.

UM: (ui)

S/A SAGE: The gas will continue to be delivered until everyone is out of the building.

UM: (ui) fuel, be careful with it.

S/A SAGE: Exit the compound now.

UM: (ui) what kind of a (ui)?

UF: (ui).

KORESH: Is there another gas mask somewhere?

UM: I don't know.

0612 KORESH: Go get another mask.

(popping sounds)

KORESH: You got to get the fuel ready.

UM: I already poured it. It's already poured.

(popping sounds)

UM: (ui)

UM: You got the (ui)?

UM: Okay.

UM: Huh?

(popping sounds)

UM: Oh.

UM: What's the problem?

UM: You want to (ui) more people.

UM: They're gonna kill us.

UM: They don't want to kill us.

UM: What?

0614 KORESH: I'm going back upstairs.

UM: Go on up to your hard (ui)

(possible gunfire in background)

(UI conversation)

0616 UM/UF I don't know.

UM: He's pretty decent.

UM: He is decent.

UM: Anybody have any other masks?

UM: David took a few of them.

UM: (ui)

(popping sounds)

UM: (ui)

UM: If you face (ui), man.

UM: All the kids, all the kids, all the kids are down in the (ui).

UM: Okay, if you face (ui), man.

UM: What you doin' now?

UM: Don't move around (ui) get ready, don't let anybody come in.

UM: Nobody comes in, huh?

UM: Nobody (ui).

UM: Right,

UM: They got some fuel around in here?

UM: Yeah, they even poured already.

UM: Poured it already.

UM: He's got it poured already.

UM: You don't want to talk on the phone anymore, huh?

S: He might be on the phone right now.

UM: No.

0617 S: They come close to it.

S: Hello.

S/A SAGE: (ui) do not, I repeat, do not, (ui), do not, not an assault, don't fire your weapons, don't fire your weapons. If you fire, fire

will be returned. Do not, do not fire. We don't (ui) non-lethal tear gas. (ui) are temporarily rendered uninhabitable. Exit the compound now and follow instructions. You are not to have anyone in the tower. The tower is off limits. No one is to be in the tower. If anyone is observed in the tower it will be an act of aggression and will be dealt with accordingly. If you come out now you will not be harmed. Follow all instructions. Come out with your hands up. Turn right. Come out of the building and walk up the driveway toward Double Ranch Road. Walk toward the large Red Cross flag. Follow all instructions. (ui) I repeat follow all instructions. You are under arrest.

S: (ui) line is dead.

UM: (ui) in the office right here?

0619 UM: Hmm?

UM: (ui) ... start the fire?

UM: We have a (ui) goin' in?

S/A SAGE: Follow all instructions. This is not an assault. Do not fire your weapons. Do not fire weapons. We do not want anyone to be hurt. The gas will be delivered until everyone is out of the building. Exit the compoundnow. The (ui) proper authorities. David, we are attempting to contact you via the telephone, attempt to initiate contact telephonically with the negotiators. If you cannot do that, if you cannot do that, the lines have been cut, indicate with a flag out the front door. Once again do not, do not send anyone in the tower. The tower is off limits. No one is to be in the tower. Send a flag out the front door and indicate if the phone line is no longer working or (ui) you have intentions to contact us (ui) tell us you are initiating telephonic contact. Once again this is not an assault.

FaAA-SF-R-95-07-10

Investigation of the April 19, 1993 Assault on the Mt. Carmel Center Waco, Texas

Prepared by:

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Prepared for:

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Fairfax, Virginia

July 1995

Introduction

Failure Analysis Associates Inc. (FaAA), headquartered in Menlo Park, California, was founded in 1967 and is the largest engineering firm in the nation dedicated primarily to the analysis and investigation of failures of an engineering or scientific nature. FaAA is a wholly owned subsidiary and the largest operating unit of The Failure Group, Inc. (Failure). Failure employs more than 435 full time staff, including more than 265 degreed professionals, more than 90 of whom hold doctorates in their fields.

Failure Analysis provides a broad range of engineering disciplines including aeronautical, marine, chemical, civil, electrical, environmental, materials and mechanical engineering. Other technical disciplines include biomechanics, computer science, geology, human performance, statistics and visual animation. They conduct their work in nine offices throughout the country including one of the nation's largest privately operated vehicle testing facilities located in Phoenix, Arizona.

Since its founding, the company has established a world-wide practice in the independent investigation, reconstruction and prevention of accidents involving structures, products, machinery and facilities. Clients include industrial corporations, insurance companies, government agencies and attorneys.

Each year the company works on over 2000 projects ranging from hotel fires to toxic waste assessments, crane collapses to product recalls, and industrial explosions to toy safety. Failure Analysis has investigated many well-known accidents and failures such as the grounding of the Exxon Valdez, the explosion of the Challenger Space Shuttle, and the NBC Dateline episode concerning gas tanks in General Motors pick-up trucks.

The company recently fielded a team of structural engineers, including a specialist in the design of buildings for protection against explosions, to assist in the Oklahoma City bombing investigation. FaAA has also conducted independent investigations concerning the assassination of President Kennedy and the murders of Nicole Simpson and Ronald Goldman. Past FaAA research has also included murder and wrongful death investigations, gun and safety design issues and arson and explosion investigations.

The present investigation represents an effort which initiated on 14 June 1995 when the NRA retained FaAA to analyze evidence connected with the government's assault on the Branch Davidian Center in Waco, Texas. The investigation consists of individual tasks, the results of which are summarized below.

Construction of Computer Model of Mt. Carmel Center

FaAA constructed a three-dimensional computer model of the Mt. Carmel Center utilizing data from a Federal Bureau of Investigation (FBI) Laboratory report (photogrammetric analysis and site survey), sketches provided in a Treasury Department Report, and careful examination of numerous photographs of the center. Although the structure is dimensionally accurate, damage caused by the tank assaults are schematic only; exact dimensions of damage are unavailable as the structure was destroyed by fire. The computer model was used in all subsequent analyses.

Gas Assault Analysis

FaAA performed an analysis of the gas assault through extensive review of numerous reports and documents including the United States Department of Justice Report on the Events at Waco, Texas, February 28 to April 19, 1993, the FBI FD-302 Reports, United States of America vs. B.E. Branch, *et al.* Trial Testimony, CNN video, FBI aerial photographs taken April 19, 1993, the FBI aerial forward looking infrared (FLIR) video, manufacturer's data , and published technical and medical literature.

Findings derived from this analysis are listed below:

CS Tear Gas

- Orthochlorobenzylidene malononitrile (CS) is a chemical which is dissolved in a liquid solvent, methylene chloride (dichloromethane) in this case, and dispersed as an aerosol.
- A CS concentration of 10 mg/m^3 is sufficient to deter trained soldiers.[1]

Means of Gas Delivery During the Assault

- 40 mm Ferret® rounds launched from conventional military M-79 grenade launchers by personnel inside five Bradley fighting vehicles. Each Ferret® round contains 3.7 grams of CS dissolved in 33.25 grams of methylene chloride.
- ISPRA Protectojet Model 5 Anti-Mob Fog Ejectors mounted to the booms of two combat engineering vehicles or CEV's. A CEV is basically an M60 tank with a boom replacing the main gun. Four ejectors were mounted on CEV-1 while two ejectors were mounted on CEV-2. Each Model 5 Ejector (M5) consists of a pressurized bottle containing 30 grams of CS dissolved in 1070 grams of methylene chloride and 700 grams of carbon dioxide propellant.

Assault Sequence

1. The first assault started at approximately 6:00 am.
   - The original plan, which called for incremental gassing over several days, was "compromised" after discharge of one M5 bottle as a result of reported gunfire from the Davidians and the pace of the operation escalated.
   - A total of 6 M5 bottles were discharged during first assault.
   - CS concentrations in the rooms directly injected by gas from M5 delivery alone ranged from 2 to 90 times that required to deter trained soldiers.
   - Methylene chloride concentrations in the rooms directly injected by gas were as high as 1.8 times the IDLH (Immediately Dangerous to Life and Health concentration)[2] and nearly to the concentration that would render a person unconscious.
   - Ferret® rounds were delivered through "every" window.
   - The maximum calculated concentration resulting from a single Ferret® round in this assault was 16 times that required to deter trained soldiers.

2. The second assault started at approximately 7:30 am.
   - A total of 6 M5 bottles were discharged during the second assault.
   - CS concentrations in the rooms directly injected by gas from M5 delivery alone ranged from 2 to 80 times that required to deter trained soldiers.
   - Methylene chloride concentrations in the rooms directly injected by gas were as high as 1.6 times the IDLH and nearly to the concentration that would render a person unconscious.
   - Continued delivery of Ferret® rounds occurred throughout the second assault.

3. The third assault started at approximately 9:00 am.
   - CEV-2 experienced mechanical problems and was no longer available.
   - A total of 4 M5 bottles were discharged during the third assault.
   - CS concentrations in the rooms directly injected by gas from M5 delivery alone ranged from 30 to 90 times that required to deter trained soldiers.
   - Methylene chloride concentrations in the rooms directly injected by gas were as high as 1.8 times the IDLH and nearly to the concentration that would render a person unconscious.
   - Continued delivery of Ferret® rounds occurred throughout the third assault.
   - Almost all available Ferret® rounds were delivered.
   - A portion of the gymnasium was demolished.

4. The fourth assault started at approximately 11:45 am.
   - A total of 4 M5 bottles were discharged during fourth assault.
   - CS concentrations in the rooms directly injected by gas from M5 delivery alone ranged from 5 to 60 times that required to deter trained soldiers.

- CS concentrations in the kitchen/dining room areas were approximately 9 times that required to deter trained soldiers.
- Methylene chloride concentrations as high as 1.2 times the IDLH were obtained.
- Deep penetrations were made into the structure at the middle of the front face and at the front door.

A summary of the concentrations obtained in the individual gas assaults is provided in the table below.

Injected Room Gas Concentrations Achieved During CEV Gas Assaults		
Gas Assault Number	CS Concentration Range, multiple of deterrent concentration*	Maximum Methylene Chloride Concentration, multiple of IDLH concentration+
1	2 to 90	1.8
2	2 to 80	1.6
3	30 to 90	1.8
4	5 to 60	1.2

* CS concentration of 10 mg/m^3 will deter trained soldiers.
+ Immediately dangerous to life and health concentration (IDLH) for methylene chloride is 5,000 ppm (17,400 mg/m^3).

Total Gas Delivered

- 20 M5 bottles and 366 to 386 Ferret® rounds were delivered (approximately 1,900 grams of CS and 33,000 grams of methylene chloride).

Fire Cause and Origin Investigation

FaAA performed a fire cause and origin investigation with the available evidence from the destroyed Branch Davidian center at Mt. Carmel. This effort involved the detailed analysis of a wide range of material, such as commercial and private video footage, FBI aerial forward looking infra-red (FLIR) footage, photographs, the U.S. Department of Justice Report, the Fire Investigation Report by Paul Gray *et. al.*, the Fire Development

Analysis by J. Quintiere and F. Mowrer, testimony by surviving members of the Branch Davidians, autopsy reports, and other materials. The principal conclusions from this investigation are:

- At least three separate fires were ignited in the Branch Davidian center within a time period of two minutes. These fires and the time that they are first visible are:
  - Fire 1 12:07:41 - the FLIR image shows the onset of a fire in the second floor of the tower at the front, right hand side of the center.
  - Fire 2 12:08:11 - the FLIR records a heat image at a rear window of the dining room. At the same time, a moderate quantity of white smoke is released at the rear of the dining room , as observed on video coverage by the Canadian Broadcast Corporation.
  - Fire 3 12:09:44 - the FLIR image shows the onset of a fire in the second window from the left on the southeast side of the chapel.

- The National Oceanic and Atmospheric Administration weather station in Waco recorded high winds beginning at noon on April 18, 1993. These winds continued unabated through the gas assault on April 19, 1993. At 11:52 am on April 19, these winds were recorded at 24 miles per hour (mph), with gusts to 30 mph. These high winds, coupled with the penetration of all windows by Ferret® rounds and the large holes opened in the structure by the Combat Engineering Vehicles (CEV's), significantly increased the rate at which fire spread through the Branch Davidian center. Given the high winds, the lack of on-sight fire fighting equipment, a primary wood structure, and any possibility of fire, the timing of the assault was predictably extremely unfortunate.

- By 12:14 PM, only six minutes after the first fire was detected, the fires had spread to fully involve the dining room, chapel, gymnasium, and second floor rooms in the front, right tower, as shown in Figure 6.

- Given the combustible wood construction of the center, the high winds present, the penetration of all windows by Ferret® rounds, and the large holes opened in the structure by the CEV's, the only effective way to fight the fires would have been to have fire equipment on site when the fires started.

- During the fire on April 19, 1993, fire-fighting equipment was not on-site until after the fire had destroyed the entire center, as shown in Figure 7.

- The methylene chloride used as the carrier agent for CS gas delivered through 40mm Ferret® rounds and the delivery systems mounted on the CEVs was not of sufficient quantity to play a significant role in the ignition or spread of the fire.
- FaAA has not been able to determine who ignited the three fires on April 19, 1995.

Fatality Analysis

FaAA investigated the official causes of death for the fatalities resulting from the initial assault (February 28, 1993), siege, and final conflagration at Mt. Carmel (April 19, 1993). FaAA engineers and health care professionals evaluated 86 autopsy reports and any available toxicological test results. In addition, FaAA obtained death certificates for 71 of the Branch Davidians. Information from the autopsy reports and death certificates was cross-referenced with data from Dr. Peerwani's *Summary Report on Forensic Examination of Human Remains from the Branch Davidian Compound, Mount Carmel, McLennan County, Texas* (September 29, 1993), which also reported the location of each set of remains at Mt. Carmel. Information from the autopsy reports, death certificates, and Dr. Peerwani's summary report was entered into a computerized master database.

To date, analysis of the data has resulted in the following noteworthy observations:

- Seventy-six Branch Davidians died on April 19, including 25 children, 30 women, and 21 men. Therefore, 72% of the fatalities (55 out of 76) on April 19 were women and children as shown in Figure 8.

- Many of the remains were in an advanced state of decomposition by the time an autopsy was performed. Recovery of the last of 76 Branch Davidian bodies was completed on April 29, ten days following the date of death. The last autopsies were performed three weeks following the date of death. The average time interval between death and autopsy was 12 days. These time intervals may significantly affect the outcome of toxicological tests.

- Multiple causes of death were reported for many of the Branch Davidians. Reported causes of death and immediate contributing factors included a combination of burn injuries (28%), smoke inhalation (27%), asphyxiation (due to carbon monoxide inhalation) (25%), gun shot wounds (11%), asphyxiation (due to suffocation) (6%), and miscellaneous trauma (3%) as shown in Figure 9. Because multiple potentially fatal events occurred contemporaneously, it was not always possible for the medical examiners to determine a single cause of death for each Branch Davidian. Furthermore, causes of death and contributing factors were not determined for two of the children, whose remains were badly fragmented and decomposed.

- Eighty percent of the reported causes of death and immediate contributing factors were attributed to fire-related causes (thermal injuries, smoke inhalation, asphyxiation due to carbon monoxide inhalation).

- Blood carboxyhemoglobin saturations were reported for fifty of the Branch Davidians and ranged from approximately 4 to 79%. As noted in Dr. Peerwani's summary report, carbon monoxide is produced in fires, and carboxyhemoglobin saturations can increase rapidly. FaAA's research also revealed that carbon monoxide

can be produced by the combustion of CS tear gas. Postmortem carboxyhemoglobin saturations exceeding 50% are typically associated with fatality.

- Forty-four of the Branch Davidians tested positive for cyanide. Cyanide concentrations in the blood ranged from 0.03 to 3.5 µg/ml. These levels of cyanide are consistent with the combustion of some plastics and organic materials, thermal decomposition of CS tear gas during the fire, and/or metabolism of high concentrations of CS to cyanide *in vivo*. In Dr. Peerwani's summary report, the maximum cyanide level was incorrectly reported as 1.18 µg/ml.

- According to the U.S. Department of Health and Human Services published literature,[3,4] 2.5 µg/ml is the minimum concentration of cyanide in the blood that can lead to coma and death. This implies that at least one of the Branch Davidians may have been in danger of cyanide-induced fatality. In Dr. Peerwani's summary report, an average lethal cyanide concentration was reported as 12.4 µg/ml for cyanide-related fatalities.

- Carbon monoxide and cyanide are known to have additive toxic effects. Similarly, the toxicity of carbon monoxide is increased in the presence of 5% carbon dioxide.

- The toxicity of hydrogen cyanide increases in the presence of carbon dioxide. It is well known that CS gas is metabolized by the body to form cyanide. Hence, some questions may arise as to the use of carbon dioxide propellant for the CS gas.

Endnotes

1. H. Himsworth, D.A.K. Black, T. Crawford, A.C. Dornhorst, J.C. Gilson, A. Neuberger, W.D.M. Paton, L. Snowden, R.H.S. Thompson, "Report of the enquiry into the Medical and Toxicological aspects of CS (Orthochlorobenzylidene Malononitrile), Part 11. Enquiry into the Toxicological Aspects of CS and its use for Civil Purposes," Home Office, Her Majesty's Stationery Office, London, September 1971.

2. Material safety data sheet for methylene chloride (CAS No. 75-09-2), Revision G, Genium Publishing Corp., Schenectady, NY, June 1994.

3. Diagnosis and Treatment of Human Poisoning. Elsevier Publishing Company, New York, 1988.

4. Syracuse Research Corporation under contract to Clement International Corporation (Contract No. 205-88-0608): Toxicological Profile for Cyanide, Draft. Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services, Public Health Service. October 1991.

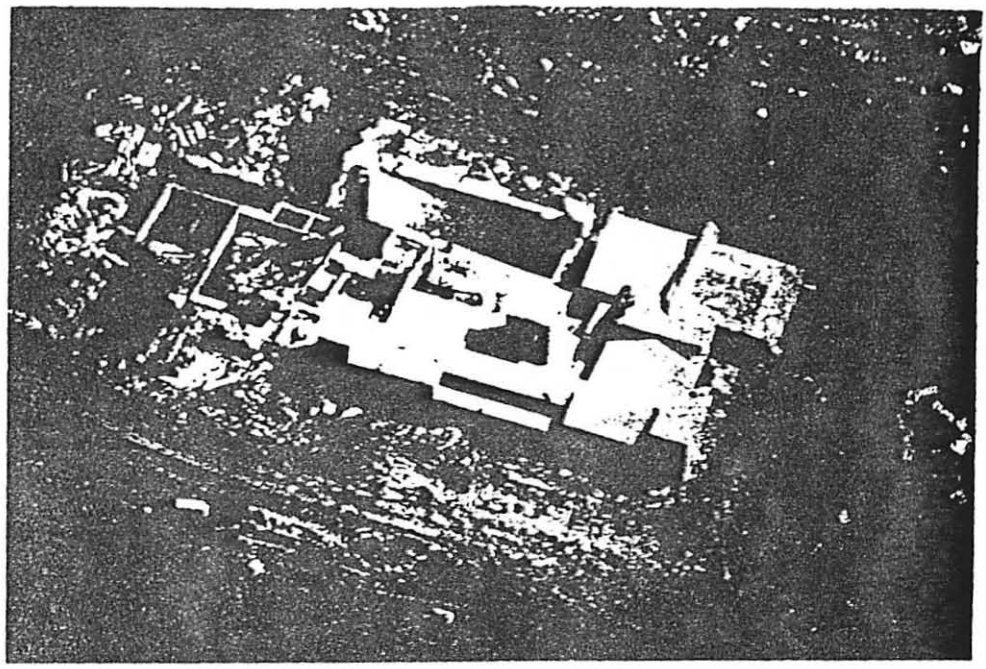


Figure 1. An aerial view of the front of the Mt. Carmel Center after three CEV gas assaults. The assaults focused on the left side as the two CEVs delivered gas to the first four windows from the left on the first floor and the first two windows from the left on the second floor. The front door area was damaged by a CEV; however, no gas was delivered at that time.

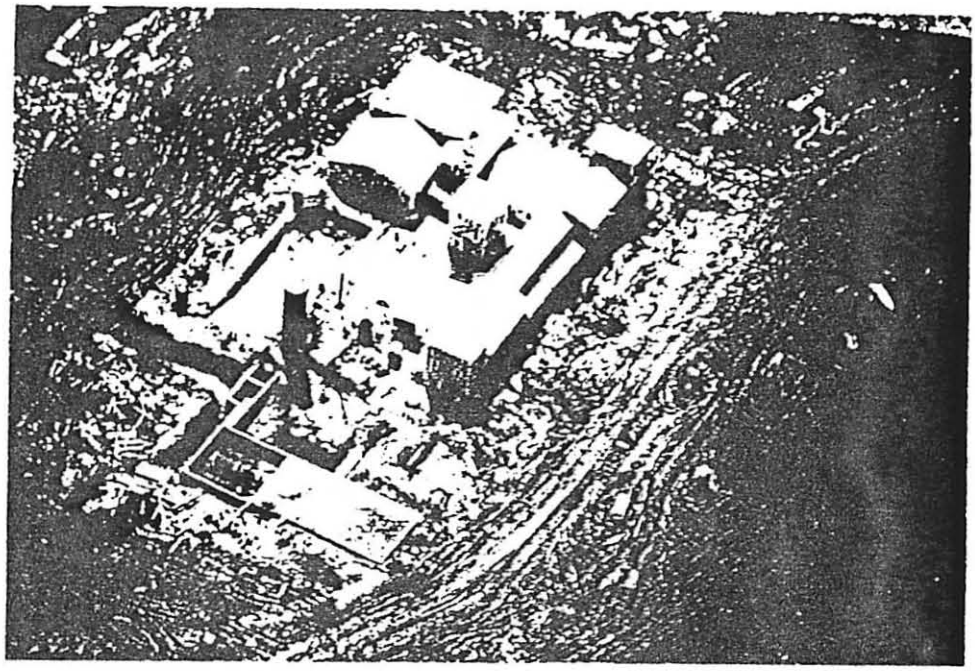


Figure 2. An aerial view of the left side of the Mt. Carmel Center after three CEV gas assaults. There were no CEV penetrations into the left faces of the structure.

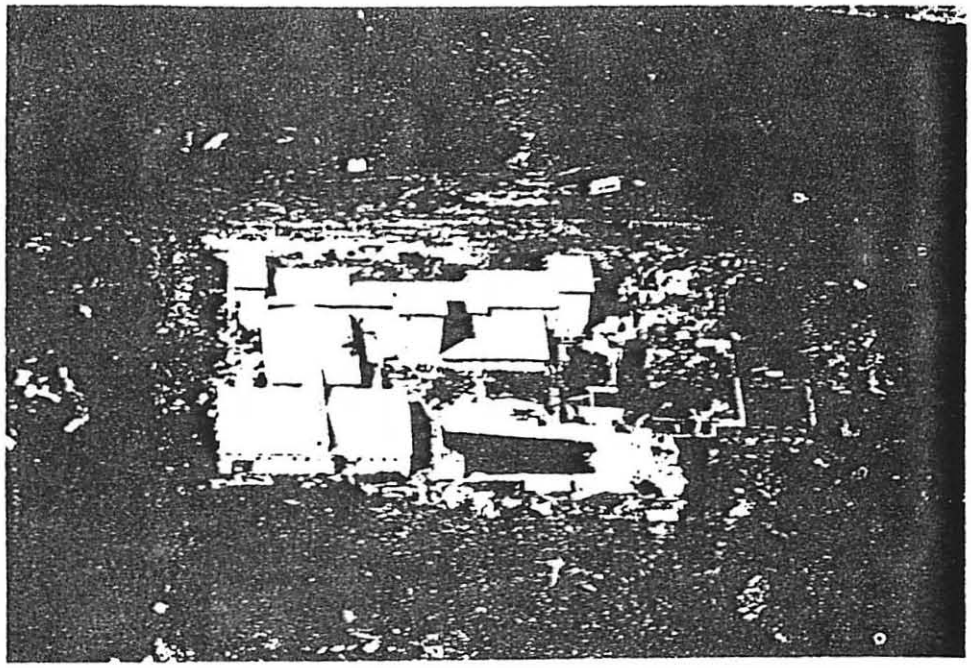


Figure 3. An aerial view of the back side of the Mt. Carmel Center after three CEV gas assaults. The back face of the gymnasium had CEV penetrations in the area of the fifth window from the right and near to the left edge.

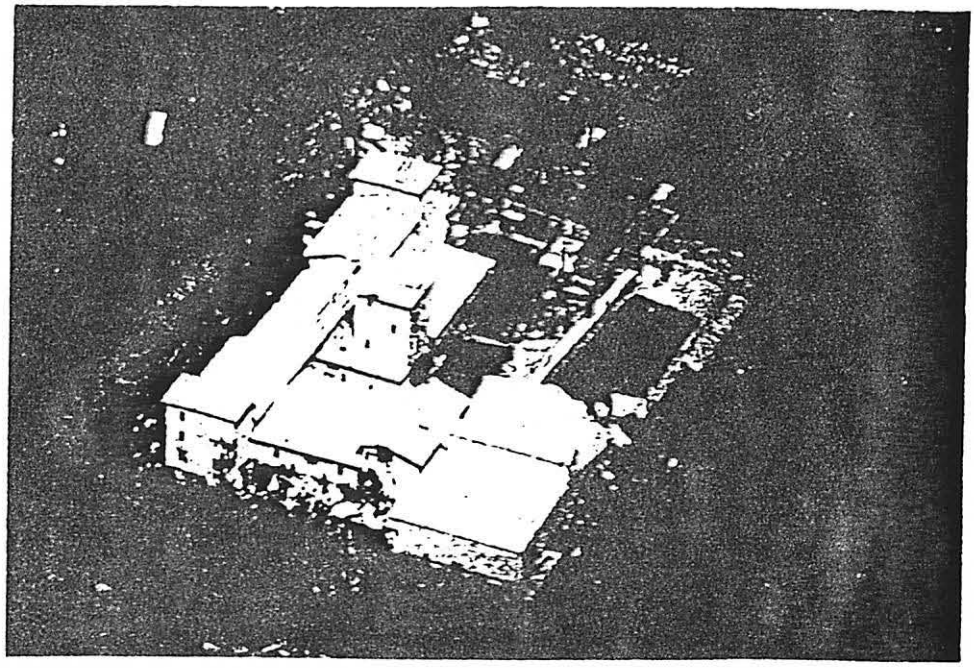


Figure 4. An aerial view of the right side of the Mt. Carmel Center after three CEV gas assaults. Evidence is shown of CEV penetrations to the first and third windows from the right (Chapel) on the first floor as well as to Koresh's quarters and the area of the second window from the left on the second floor. Note that demolition of the gymnasium had started at this time and the presence of a concrete slab which supports many go carts and some debris from the CEV assaults in the area in front of the Chapel.

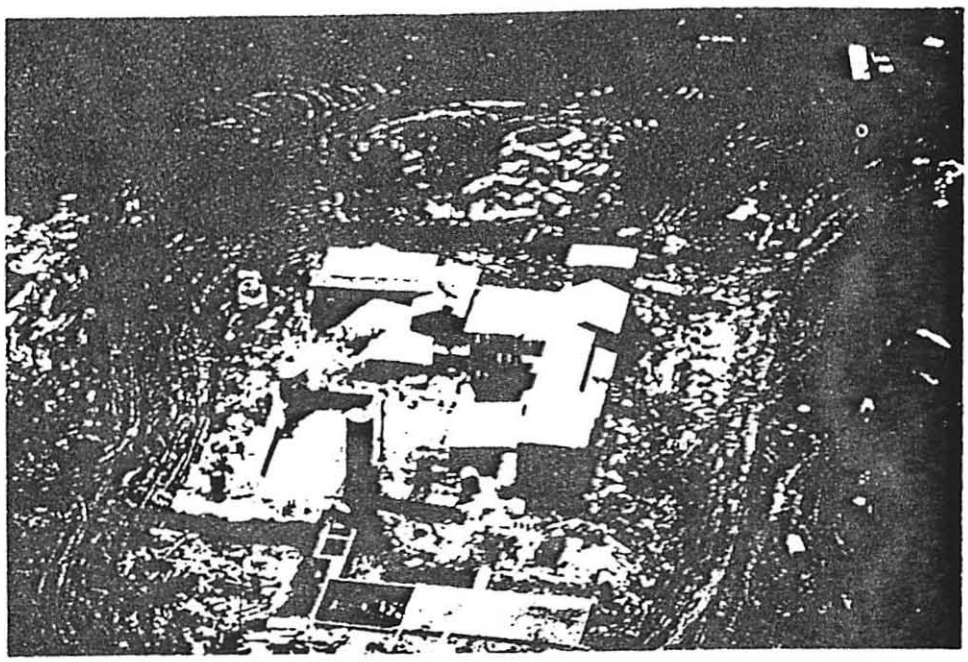


Figure 5. An aerial view of the left side of the Mt. Carmel Center during the fourth CEV assault. At this time, approximately half of the gymnasium had been demolished and a CEV was penetrating deep into the center of the front of the structure.

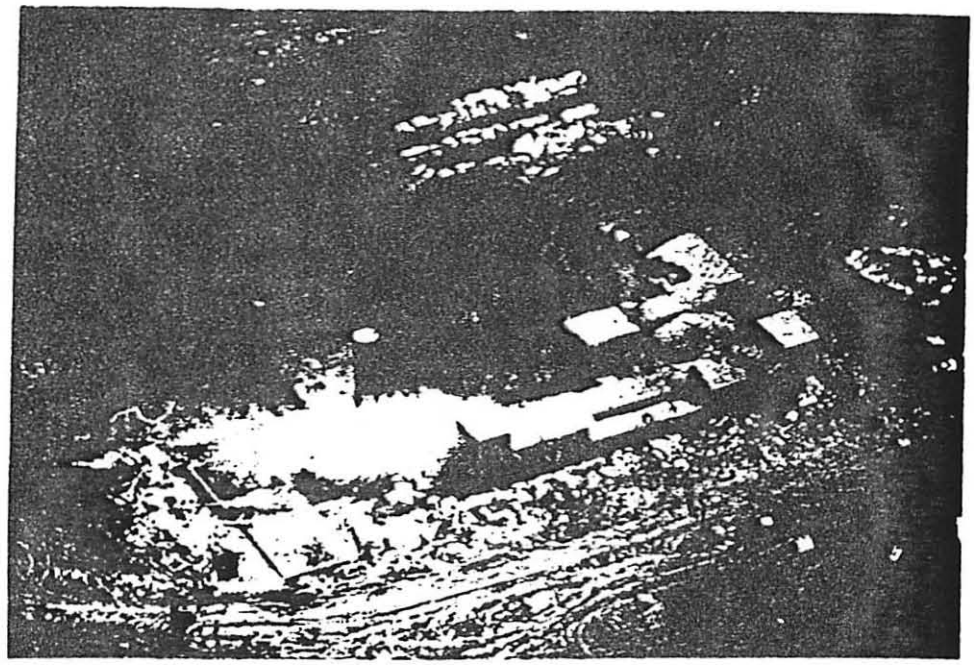


Figure 6. FBI aerial photograph of the Mt. Carmel Center, approximately 6 minutes after the first fire was detected. Rapid fire spread is observed in the southeast tower (fire #1), the dining room (fire #2), and the chapel/gymnasium (fire #3).

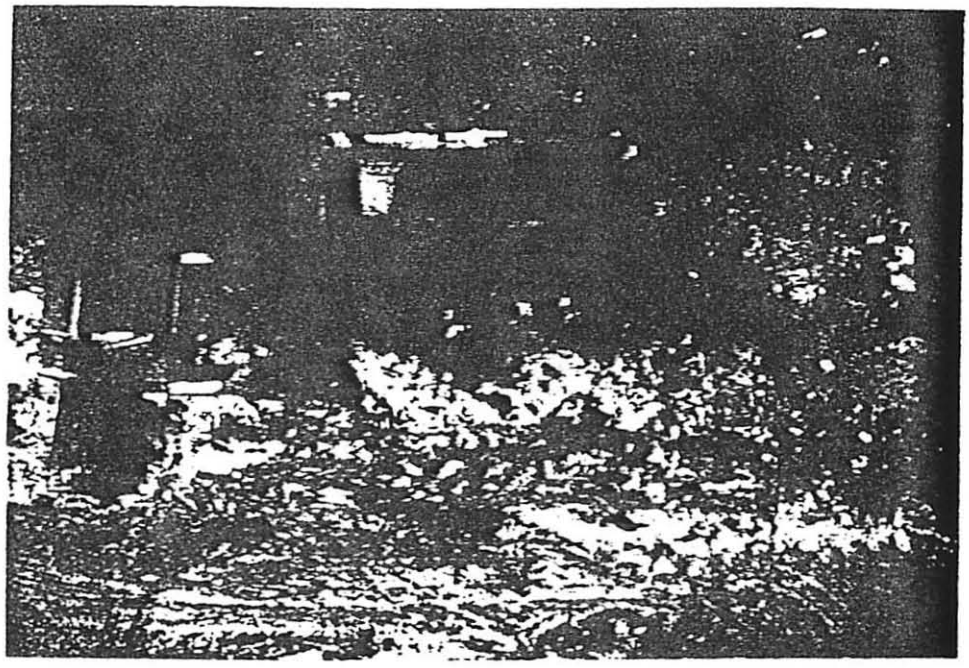


Figure 7. FBI aerial photograph of the Mt. Carmel Center, prior to arrival of fire fighting equipment. Nearly complete destruction of the center is evident.

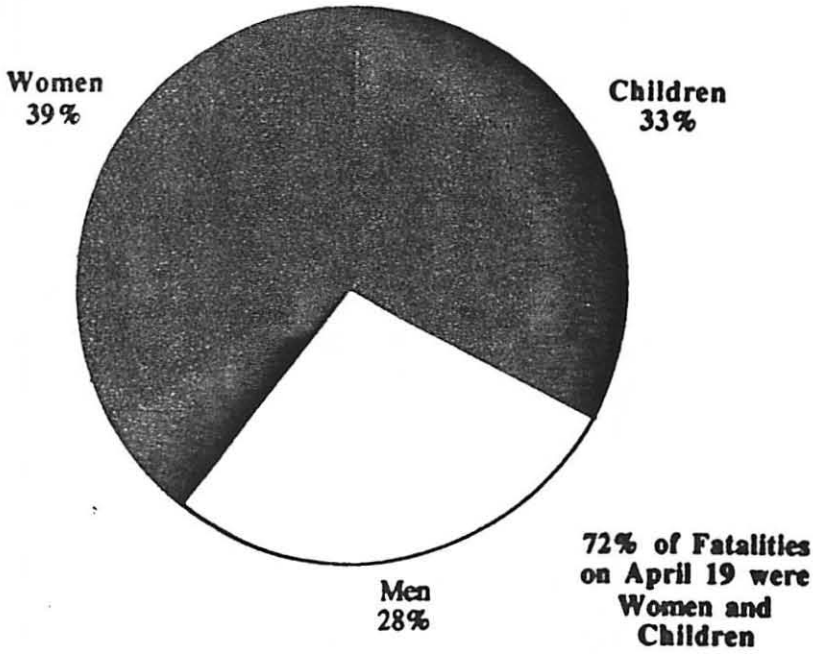


Figure 8. Branch Davidian Fatalities on April 19, 1993 by Sex and Age.

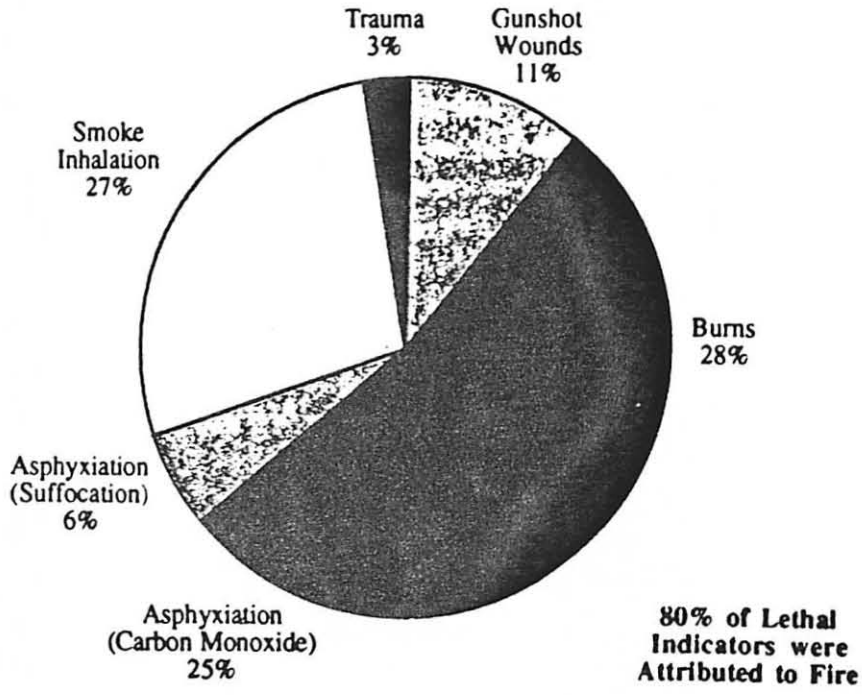


Figure 9. Causes of Death and Contributing Factors Among Branch Davidians on April 19, 1993.

PREPARED STATEMENT OF JAMES G. QUINTIERE, PH.D., PROFESSOR OF FIRE PROTECTION ENGINEERING, UNIVERSITY OF MARYLAND

BACKGROUND:

My names is James Quintiere. I am a professor of Fire Protection at the University of Maryland, College Park, MD. Before coming to the University, I was a Division Chief in charge of fire research at the Center for Fire Research of the National Institute of Standards and Technology. I have 25 years of experience in fire research, education, and in the science of fire growth. I am currently Chairman of the International Association for Fire Safety Science, a world organization of scientists and engineers for the promotion of fire research and its beneficial applications.

Shortly after the fire of the Branch Davidian compound at Waco, Texas on April 19, 1993, I was asked to contribute to the fire investigation. In doing so, I enlisted the support of Dr. Fred Mowrer, also of the Department of Fire Protection Engineering, University of Maryland. We visited the Waco fire site during April 22-24, 1993. At that time, we joined the team under Paul Gray (Houston), which also consisted of Thomas Hitchings (Pittsburgh), William Cass (Los Angeles), and John Ricketts (San Francisco). The group, under Paul Gray, would focus on the cause and origin of the fire. We would analyze the development of the fire, and draw interpretations and conclusions from that analysis.

VISUAL DATA:

The fire had completely leveled the compound, so that no significant remains were available to establish the development of this fire. However, this fire was probably one of the most extensively recorded fires in history. Not only were commercial television stations continuously recording this event, but surveillance government planes were taking still photographs and using a forward looking infrared (FLIR) video. These visual records became the principal source of data for our analysis.

The video and photographic data were made available to us by the FBI. Video copies of data we requested were given to us at the FBI Headquarters in Washington, D.C. on April 25th. Subsequently, the FBI video and photo laboratories supplied additional materials and support as requested during our investigation. The data included television coverage of the fire by the Canadian Broadcast Corporation (CBC), by Channel 10 of Waco, the FLIR video recording, and aerial photographs. These covered the time period of the fire, approximately 12:00 to 12:30 p.m. CDT.

The principal source of data to establish the inception of the fires and their locations is the FLIR video. Based on the calibrated clock of the FLIR, the other video and photographic records could be correlated, and a comprehensive visual record of this fire could be

established. From this visual data, I was able to determine the point of origin of the fires, their growth rates, and estimates of the fire energy output rates at critical transition points in their development. I also drew conclusions on the nature of the ignition sources, the role of the tear gas, the effect of the wind, and the survivability time of the occupants. I will summarize these conclusions, and how they were determined. In addition to this statement, I would like our official report and a video I made for the criminal trial to be submitted for the record of this hearing. If you wish, I can review the video as well.

IGNITIONS:

At least three separate fires began in the compound on the day of April 19, 1993.

Fire 1: The first began at 12:07:42 pm CDT in the front room of the second floor right tower. This is believed to have been a bedroom. We can expect the furnishings to be indicative of a crowded bedroom. I counted about 7 mattress box springs remains in the fire debris at this general location, presumably from this and adjoining rooms.

The precise time of the onset of this fire can be determined because of the characteristics of the FLIR camera. The FLIR camera records the intensity of light and heat radiation in the wavelength range of 8 to 12 micrometers (u.m.). This is a contrast to what our eye sees which is in the range of 0.4 to 0.7 u.m. As a result, the FLIR operated on autoranging which would set the center of its gray scale to the ground temperature (say roughly, 81 F). Then it set its range 40 degrees above and below this mid-temperature. Hence, as an object in the field of view emitted more radiation due a temperature increase, the object would appear more white on the IR video. For an 81 F midrange temperature, this would mean that a change from grey to white color would indicate a temperature increase to 120 F or higher. Reflected sun light could also cause white images, and the FLIR could penetrate smoke roughly 20 times more than the naked eye. Thus, the FLIR could see through cold light smoke; but as the smoke became hotter and thicker, it would see it as white smoke. The FLIR sensor would become saturated at 194 F, above which the image would not be distinguishable. Consequently, the FLIR could detect, by a color change to white, temperatures as low as approximately 160 F (+/-30 degrees due to autoranging). And, it could see through much of the early light smoke of the fire that would obscure the building by normal viewing. The FLIR is the definitive key to the detection of these fires.

The image of the temperature rise of the first fire is seen in Figure 1 (Report, Fig. 10). This is seen in the second floor south corner bedroom. The first sign of this temperature rise was seen at 12:07:42 in the front side of this room. The image in this photograph occurred 9 seconds later, and is due to the transport of hot gases within the room.

In a similar manner, the other fire starts were determined. It appears that they all began on the perimeter of the building.

Fire 2: The second fire began in the dining room on the first floor level, approximately one

minute after the first fire, at 12:08:48 pm CDT. This is seen on the FLIR video by a hot plume rising from the rear of the dining room. On surveying the fire debris, I counted 20 burned stacked chairs in this general location within the dining room.

Fire 3: Nearly one minute after the dining room fire began, the third fire is seen in the chapel window on the right side of the building at 12:09:45 pm CDT. This is shown in Figure 2 (Fig. 23 of our report). The dining room fire is also visible, and the bedroom fire has now affected adjoining rooms, adjacent and above.

Less than a minute later, a related or separate fire is seen to occur in the debris area behind the chapel at 12:10:23 pm CDT. This is shown in Figure 3 (Fig. 26 of our report). This could have been connected to the previous chapel fire. The time difference between the two fire observations is comparable to the time associated with flame spread on a liquid fuel poured between the two points.

Figure 4 (Fig. 27 of our report) shows an aerial view at about the time of the possible fourth fire start. By comparing this to the previous figure, it can be seen that the visible smoke is much more evident than in the FLIR image of Figure 3. This shows the advantage of the FLIR in being able to see through this smoke.

FLASHOVER:

Following ignition of these fires, the next significant event is flashover. This marks the transition point of a discrete fire in a room to a fully developed fire in which flames now fill the room and emerge from the windows. It is rapid, and can take place in seconds. It occurs after the room is sufficiently heated. It marks the difference between survivable and non-survivable conditions in that room. These events can be seen, directly and indirectly, from the video records.

The first is seen directly for Fire 1 as shown as window flames appear in the split screen images of Figure 5 (Fig. 58 of our report). This occurs at 12:09:42, two minutes after the start of that fire. Calculations show that this fire growth rate for the initial burning item would be rated as "fast" according to NFPA standard 72E. Its energy release rate would be about 2 megawatts (MW) at flashover. This is compared to an estimated 50 (k^W) that was necessary for detection by the FLIR. The detectable fire is like a 1 ft^2 gasoline fire at flashover.

Fires 2 and 3, in larger rooms, grow much more rapidly than the bedroom fire. Flashover occurs in about 2.5 minutes for the dining room (12:11:07), and in 4 minutes for the chapel (12:123:49). Figure 6 (Fig. 39 of our report) shows the effect of flashover for the chapel by black smoke which suddenly emerges from the front opening in the building. This smoke, pouring into the 25 mph wind, is due to the overpressure caused by the sudden increase of energy associated with flashover in the chapel.

FIRE CAUSE:

It is concluded that these three fires, occurring nearly at 1 minute intervals, were intentionally set from within the compound. Even if the tank battering had caused the spillage of fuel from lamps, a match would be needed to initiate the fire. An electrical spark is ruled out because the electric power was shut off in the compound. It is obvious that these three fires needed an ignition source deliberately placed in each of the three locations. Also, none of these three fires could have caused any of the others because their growth rates would not provide sufficient heating to cause such remote ignitions. Any external heat source that might have been used to start the fires would have clearly been visible on the infrared video. This was not seen. Although normal furnishings and interior construction characteristics would provide a means for fire propagation, the more than usual rapid spread of these fires, especially in the dining room and chapel areas, indicates that some form of accelerant was very likely used.

TEAR GAS:

Methylene chloride, used as a dispersal agent for CS tear gas, is flammable as a vapor at a concentration of 12 per cent in air; however, it is not easily ignited as a liquid. In fact, it will put out a match on attempting to ignite the liquid. Although fire spread was relatively rapid in the compound, these rates are not indicative of the much more rapid propagation that would be associated with a flammable mixture in the air. Those rates would be in excess of 2 ft/s, and would be seen like a fire ball moving through the atmosphere of the interior of the compound. No such characteristics were observed in this early fire growth.

Recently, I conducted additional experiments to access the role of methylene chloride as a wetting agent to available fuel types in the compound, such as wood and paper. Since methylene chloride is a liquid at normal temperatures, it could have been absorbed into the furnishings of the compound. From my experiments, I can conclude that the methylene chloride had no enhancement effect on the fire spread over room furnishings. Also, I can conclude, from the flashpoint data (197 C or 387 F) of CS itself, that its deposition on furnishings should not have had a significant effect on fire propagation either. Hence, the tear gas had no bearing on the propagation of this fire.

WIND:

Wind effects did have a profound effect on the external fire spread over the compound. An approximate 25 mph wind from the south, caused the fire plume to be bent at approximately 65 degrees from the vertical when the fire fully involved the compound. It is estimated that the fire was expending 3600 MW at this time with an observed length of approximately 240 ft.

Wind effects did not appear to have had a significant effect on the fire growth within the compound. This is seen in Fire 1 where flames and smoke emerge periodically from the

right tower windows into the wind. This could have been as a result of closed doors or windows on the downwind side of the compound. The tank-made openings on the front of the compound could have had some effect on fire growth over the first floor, but more significantly could have provided air to areas of refuge for some of the occupants.

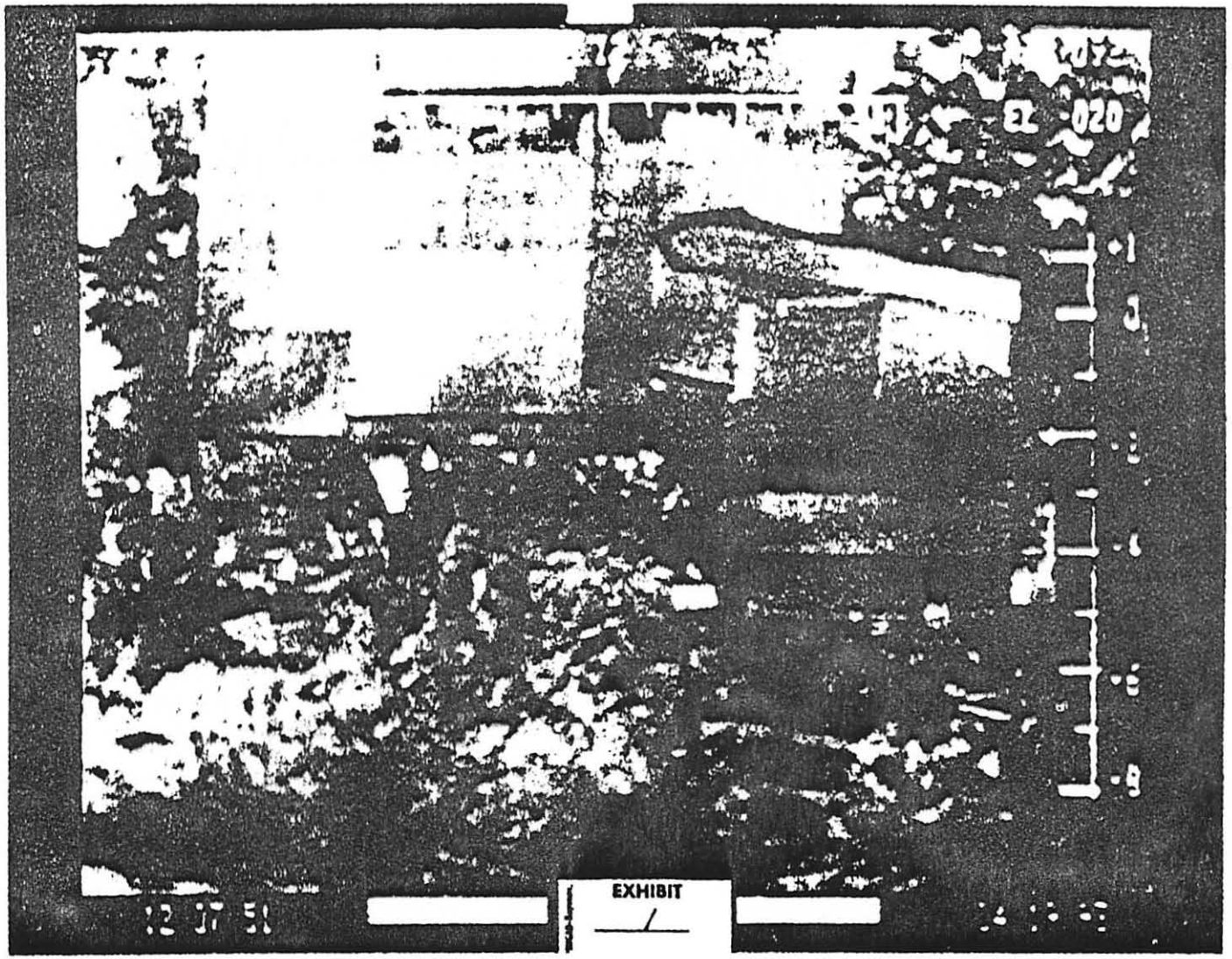
SURVIVABILITY:

It is estimated that the occupants would have had sufficient warning of the fire to enable to escape, for at least up to five minutes from its inception, and up to nearly 20 minutes in some more protection locations. This is dramatically indicated by one occupant who jumps from the second floor 12 minutes after the start of the fire. Although smoke would have impaired visibility, exits were within 30 feet of most occupants, with additional openings made by the battering tanks.

Carbon monoxide in the smoke would have been the primary threat to the occupants. However, preliminary autopsy reports made available to me indicated that only five of 31 victims with recorded CO levels, had lethal levels of carbon monoxide (CO). The remaining 26 victims, with recorded CO data, stopped breathing before lethal CO levels were attained. Hence, if these data are correct, at least 26 victims did not die due to the fire. The autopsy report goes on to indicate that, in at least 17 of the victims, death was attributed to gunshot wounds.

CONCLUDING REMARKS:

During the weeks preceding the fire at the Branch Davidian compound, we were all bystanders to the drama of the standoff, and wondered how it would end. The eventual outcome was a horrible event. In the two years since, many theories about the fire have been proposed; some quite bizarre. I hope this presentation, our report, and the video I would like to submit, will help to explain the events of this fire.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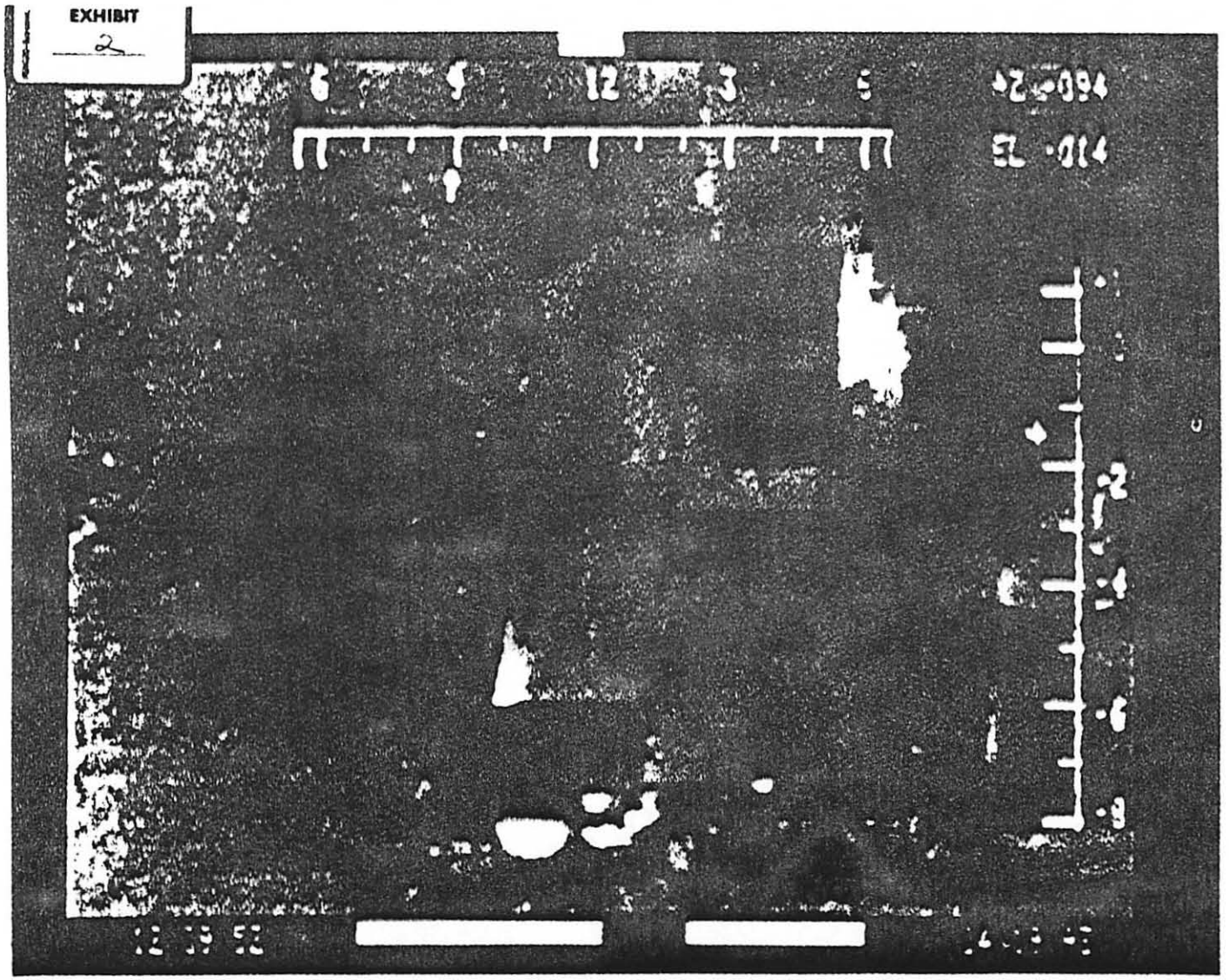
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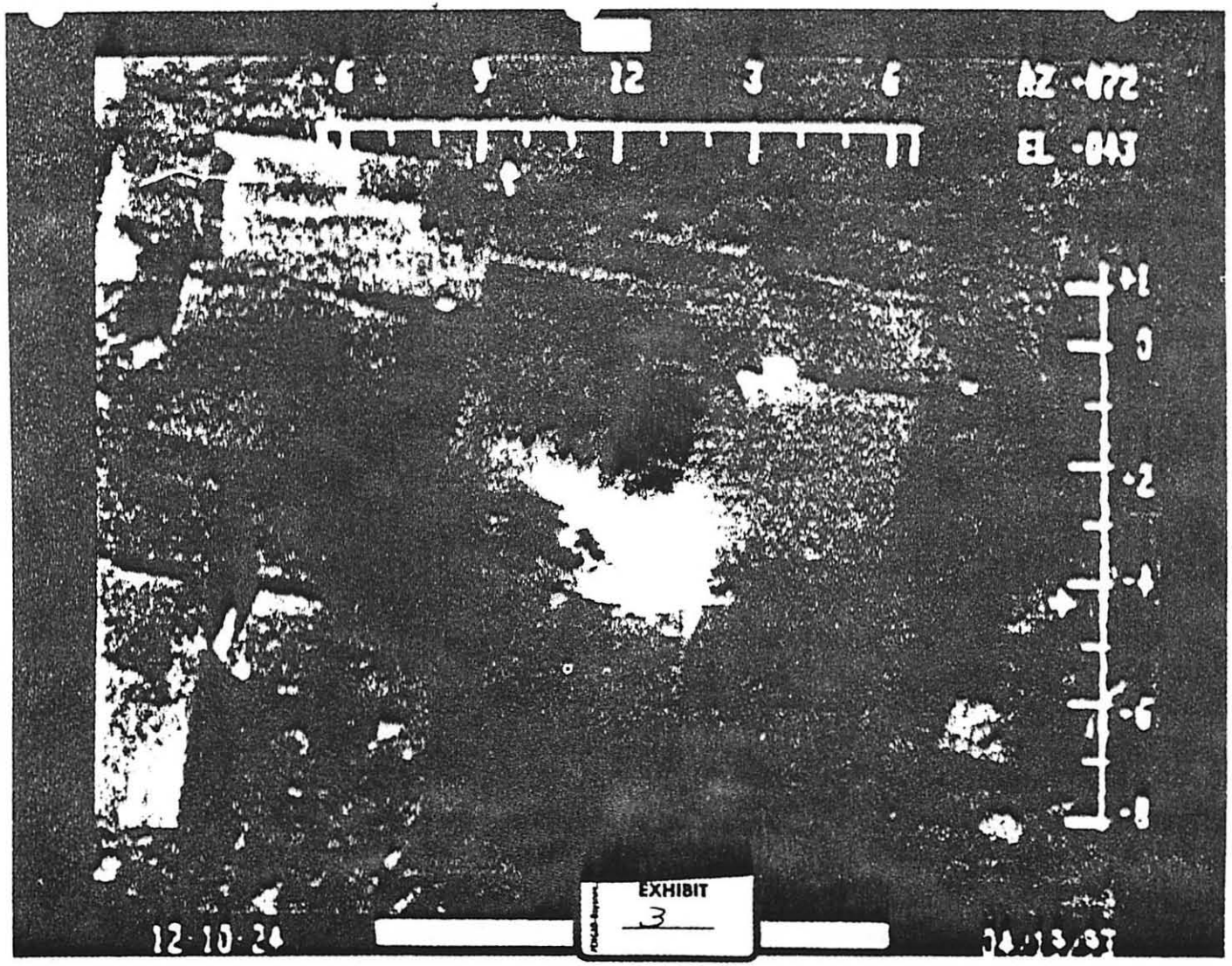
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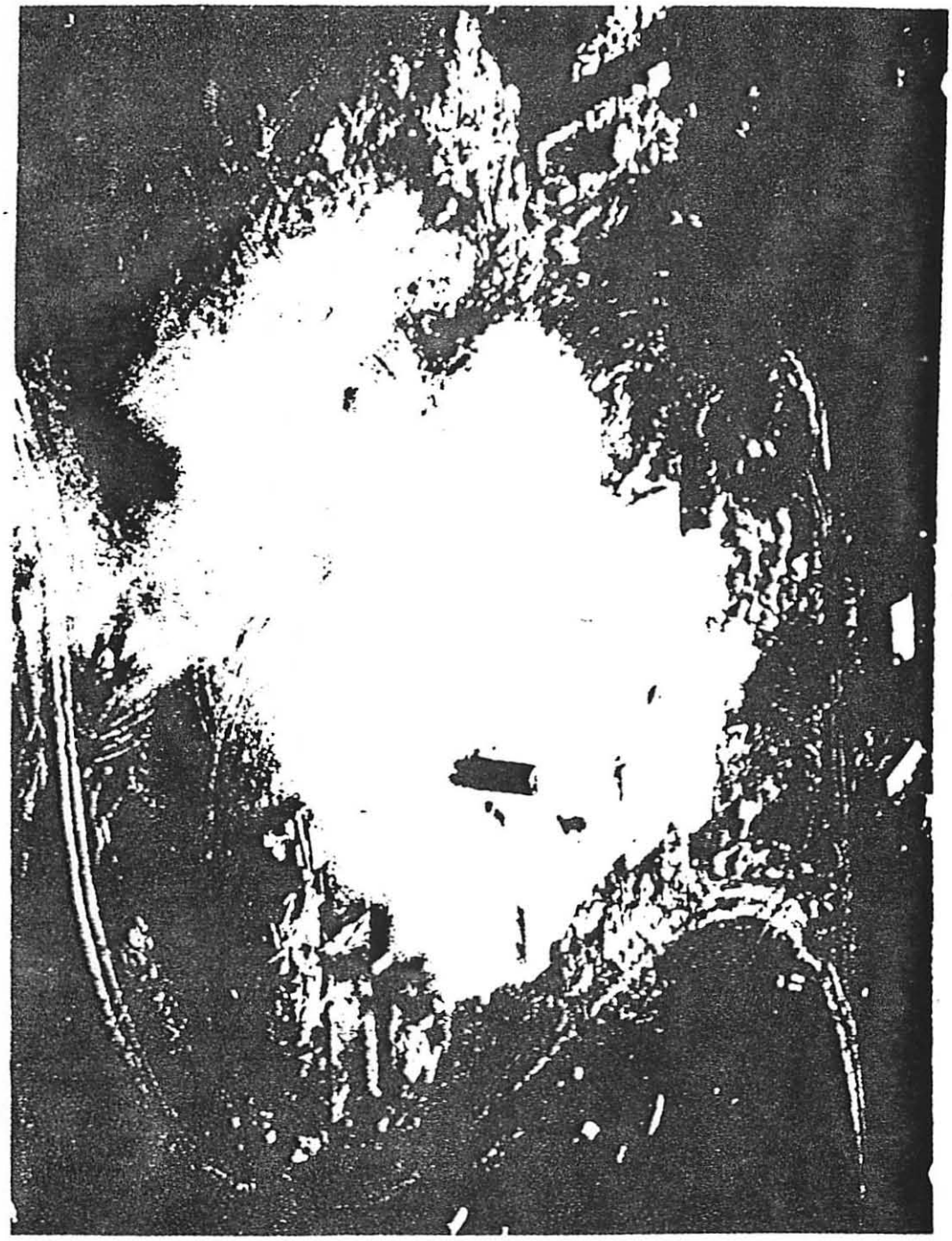

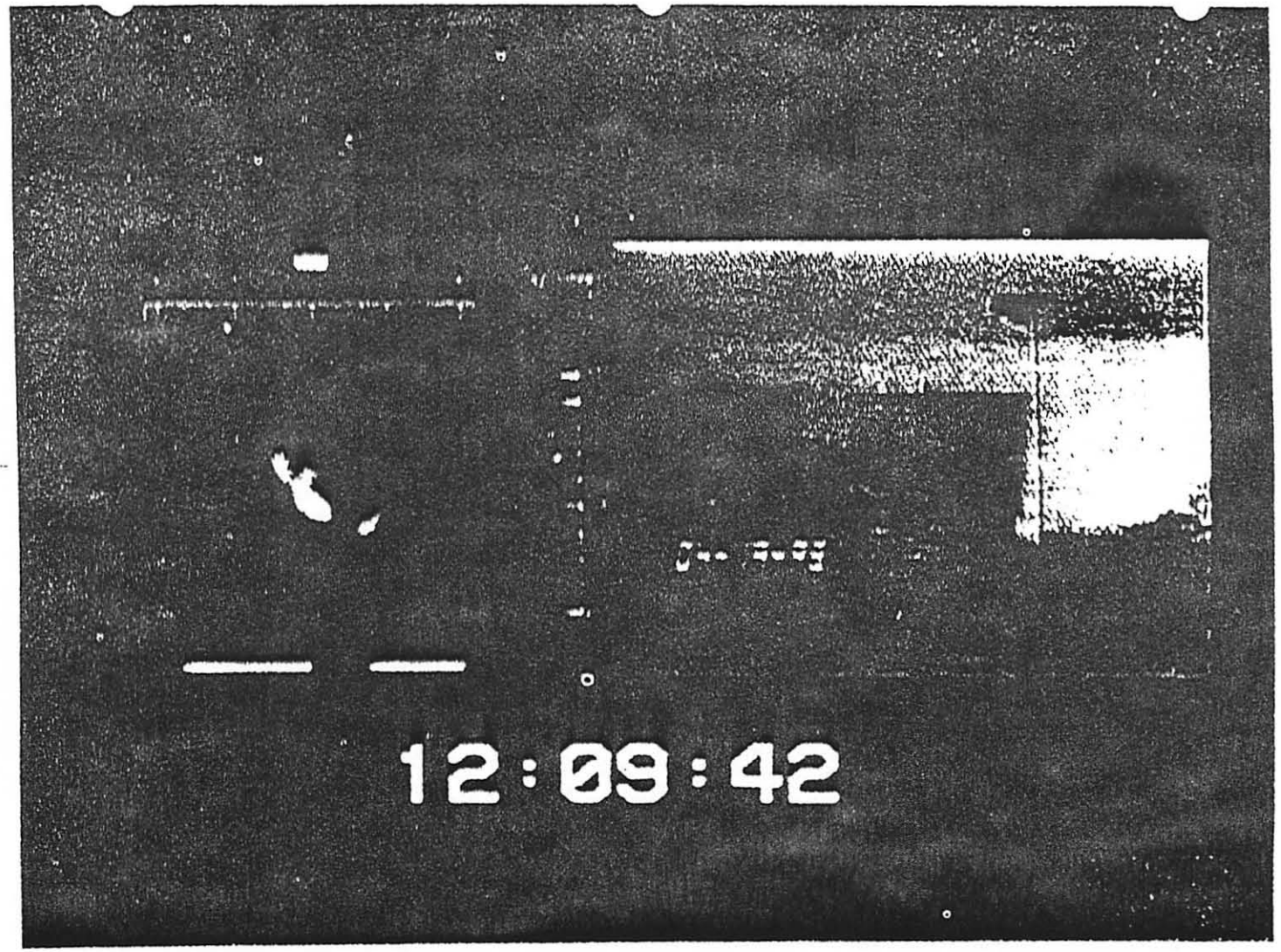
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