Boston

A Doomsday Scenario

THE DAY THE "IMPOSSIBLE" HAPPENED

Enough nerve gas to kill a million people is being stored in a Cambridge laboratory. Experts say it can't leak out. Here's what could happen this month—in less than four hours—if it did.

BY DAVID GOODMAN

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width sections are factual, based on testimony given before the Cambridge City Council and on interviews and documents. The indented sections are fictional: they trace, using fictitious names, a scenario based on what is known about nerve gas and about the consequences of an accident, which, some experts insist, is a remote possibility.

RUSSELL HIGLEY WALKED OUT OF THE Middlesex Superior Courthouse looking tired. The lawyer for the city of Cambridge had just lost the latest round in the city's long battle against Arthur D. Little (ADL). The Cambridge-based multinational research and consulting firm, which last year grossed \$190 million, had begun work in the fall of 1983 on a Department of Defense (DOD) contract to test nerve gas. Since March 1984, when it ordered a halt to the research, the Cambridge City Council has lost every legal round against the corporate giant. Higley is anticipating a long, hot summer of continued litigation to halt the testing. The next round is scheduled for this month.

Just a few miles from the courthouse is the new Philip L. Levins Chemical Surety Laboratory, part of the extensive ADL complex in Acorn Park, Cambridge. The Levins lab is working on DOD contracts to develop new protective clothing for chemical warfare, to design low-level detection equipment for nerve gas, and to find new ways to detoxify chemical-warfare agents. In its third-floor premises in ADL's Building 15W, the lab is storing up to half a liter of various "supertoxic" war-gas agents for use in those experiments—enough to kill as many as 1 million people.

There is one question that ADL officials have consistently downplayed during the public debate over the nerve-gas research: what would happen if an accident occurred at the Levins laboratory? Local residents and city officials have suggested numerous scenarios. A major fire at the Levins lab could reach the chemical storage room, ignite the up-to-10 gallons of highly flammable liquids kept there, and cause the nervegas containment vessels also stored there to rupture and release their toxic contents; an explosion, in the boiler room or of the natural gas that is kept in Building 15W, could obliterate the facility's multiple safety systems; a fire in the lab could shatter the room's only window, allowing poisonous gas to escape; there could be a plane crash, an earthquake, terrorist sabotage, . .

"It is really quite impossible for [the nerve gas] to get out of the lab," says ADL vice president for public relations Alma Triner. Harvard professor Matthew Meselson, a world-renowned authority on the uses and effects of nerve gas, is not quite so confident. "Yes," he says, regarding nervegas research in the United States, "there have been accidents."

July 25, 2:12 p.m.

Deputy Fire Chief Tom Fisher of the

Cambridge Fire Department was sifting through a pile of paperwork he had let accumulate on his desk when the alarm sounded. The red light on the console at the fire department's headquarters in Inman Square lit up. "Shit, it's ADL," he muttered as he reached for his coat.

His men were already mounting their trucks as Fisher rifled through his files, looking for the instructions regarding fires at the Arthur D. Little complex, in North Cambridge. He knew there'd been some controversy about the work they were doing out at the ADL labs, but on this balmy July afternoon he couldn't quite recall what all the fuss had been about. He found the file; it was thinner than he'd expected. Fisher joined Fire Chief Bill Fox as the chief jumped behind the wheel of the department's red station wagon, set the siren screaming, and raced for the Cambridge—Arlington line.

Fisher flipped open the ADL file as they headed out to Route 2. He felt his heart start to beat faster as he read. "This says they're working with 'nerve agents' out there," he said to Fox. "What the hell are 'nerve agents'?"

At the city council hearing in October 1983. ADL's representatives refused to confirm or deny that the company would be experimenting with nerve gases, preferring to call the materials "chemical surety agents." In fact, a great deal of confusion surrounded the identity of the materials kept at ADL until the Massachusetts Department of Public Health (DPH) released an internal report to the Cambridge City Council in late December. The report revealed that the nerve agents Soman (known by the industry code GD), Sarin (GB), and VX would be used in the lab. They are among the deadliest chemical-warfare agents in the U.S. arsenal.

In early November ADL senior vice president D. Reid Weedon, Jr., had told residents who lived near the lab that it would not keep more than one liter of the nerve agents on its premises at any one time. In their statements to the DPH, included in the December report, ADL's representatives were more conservative, voluntarily stating that the lab would not store more than half a liter of nerve agents at any one time.

More recently, Weedon has commented

that although the federal government would approve of ADL's holding up to one liter of nerve agents, "we have no plans to change" the current in-house guidelines, which state that the lab will not store more than one-half liter at a time.

ADL's chief executive officer, John Magee, in his testimony before the Cambridge City Council, emphasized that half a liter of nerve gas was no cause for alarm. "We're talking about quantities that are very small," he testified. "You can't kill people with very, very small quantities of this material."

A United Nations report on chemical warfare notes that a dose of five milligrams of the nerve agent Sarin is lethal to humans. The same report notes that as little as half a milligram of agent VX would have the same consequences. With half a liter of such substances on hand, ADL would have in its possession a lethal dose for anywhere from 100,000 to 1 million people. It should also be noted that in an actual accident, dispersal of the gas would be random, and fatalities would likely be much lower. But Frank Westheimer, a Harvard professor emeritus of chemistry and a former consultant to the

THE NERVE-GAS LAB: HOW SAFE?

Arthur D. Little officials insist that every precaution is being taken to prevent disaster.

FFICIALS OF ARTHUR D. LITTLE ARE confident that the nerve-gas testing the company is conducting at its Philip L. Levins Chemical Surety Laboratory poses no threat to the general public. ADL's director of health and safety, Scott Strickoff, admitted in an affidavit filed in Middlesex Superior Court in March that there is no question about the toxicity of the substances we will be analyzing; if they were not potentially hazardous we would not have constructed the secure facility." But he went on to say, "We believe less risk is posed to the community from tiny quantities—that is, a few milliliters of highly concentrated hazardous chemicals used by skilled scientists working under carefully controlled conditions than is experienced during our daily exposure to . toxic materials used in households."

Strickoff explained that the nerve agents will be stored in quarter-inch-thick welded-steel drums inside a windowless concrete room equipped with automatic sprinklers. "The likelihood of an internal explosion or fire within this room is nil," he stated. "All manipulations with the material are performed within a chemical fume hood [in the Levins lab] connected to the exhaust air filtration system. Although... one of the working laboratory spaces has a sealed double-glazed exterior

"I have no interest in either bankrupting Arthur D. Little or leaving my wife a widow," says John Magee, ADL's CEO.

window, the probability of chemical surety material [nerve gas] release through the window, in the event of breakage, is very small since the material normally will be confined within the hood.

"In the event of a major structural building fire, the material in the chemical storage room could be released, although such a fire is unlikely since the building in which the laboratory is located is protected by automatic sprinklers. . . . [ADL has] concluded that even under the worst

weather conditions, and even if all of the individual storage vials were ruptured in a major building fire on an occasion when the amount of material in storage was at the maximum which we would accept, a lethal concentration would not impact upon any structures or public roadways or public property in any of the surrounding communities."

Strickoff further asserted that the lab facility, equipment and procedures [were] reviewed by two independent outside consultants. This was in addition to the inspection by the U.S. Department of Defense, which, he said, has also approved of ADL's operating procedures.

In his testimony before the Cambridge City Council, in March 1984, ADL chief executive officer John Magee made perhaps the most convincing defense of his company's safety precautions. "The laboratory is not far from my own office," he noted. "If there were an accident, my fellow employees and I would be the first to suffer, and the consequences would probably ruin my company. As a practical matter I have no interest in either bankrupting Arthur D. Little or leaving my wife a widow." He advised the city council: "When you hear the fright talk about nerve gas. please keep these practical considerations in mind.' -D. G.

Pentagon on chemical-warfare agents, emphasizes, "This stuff [VX] is 1,000 times as toxic as cyanide—I think that's something to be uncomfortable about."

ADL has tried to allay concerns about its work. "Certain things are trigger words for all of us," ADL vice president Triner acknowledges sympathetically, "especially when people say 'nerve gas'." Company literature touts the Levins lab as an "aheadof-the-state-of-the-art toxic chemicals handling facility." "It's a totally safe, secure facility, safer than the average kitchen or laundry room," exclaims Triner enthusiasti-

2:17 p.m.

"They've got some military contract to work on nerve gas," said Chief Fox to his deputy, staring straight ahead as he maneuvered the speeding car through traffic. Fisher continued reading. "It says here we gotta have a chemist on hand before we can do anything at the site."

"Look," snapped Fox, "they said it was practically impossible that that lab would blow. Now let's just hope somebody overcooked a hamburger and wait till we get there before we start jumping

to conclusions."

They sped past the giant MBTA Alewife parking garage, and approached ADL's Acorn Park complex. Near the muted brown brick facade of the lab. traffic had slowed to a crawl, and Fox cursed as he saw a hook-and-ladder driver blasting his horn futilely. A steady stream of cars leaving ADL was blocking traffic in both directions, and one driver had sideswiped a car as he'd strained to see what the commotion was about.

Fox jumped out of the station wagon. "I'm going in," he said to Fisher as he reached for the oxygen tank in the back-

Fox worked his way across Route 2, where he was spotted by an old friend, Cambridge police officer Jim Owens, who had just arrived on the scene. "They say there was an explosion at that nervegas lab," said Owens. "What are we supposed to do, Bill?"

"Nothing," shouted Fox, as he donned his artificial breathing apparatus. "Not a damn thing," he repeated, trotting to the entrance marked All Visitors.

No local emergency plan exists to deal with anything other than routine mishaps at the Levins lab. Public officials are remarkably consistent in their willingness to pass along responsibility for local emergency planning to other agencies, each of which, in turn, points its finger at still another authority.

"We don't know what can or can't be done," says Cambridge deputy fire chief Edward Dudley with a shrug. "Our personnel would wait for the arrival of the Cambridge deputy fire chief, who would act on

THE PROFITS OF NERVE GAS

Critics claim that the government is farming out nerve-gas work because it has overloaded its own research facilities.

HEMICAL WARFARE IS GOOD BUSINESS, and Arthur D. Little wants a piece of it. The Reagan administration has requested \$1.1 billion for chemical warfare in fiscal year 1985. Of this sum \$813 million would go for battlefield suppliesprotective clothing, gas masks, decontamination equipment, and maintenance of current chemical stockpiles. Another \$105 million would fund production facilities for a new generation of chemical agents known as binary weapons (in a binary artillery shell, the two chemical compounds that make up the nerve agent are kept separate until the moment of use). This relatively safe design would make the testing, production, and storage of nerve

gas in urban areas more politically feasible. (As of this writing, Congress has for the second year in a row rejected funding for the binary-weapons program.)

Critics of the administration's chemical-warfare program claim that the nervegas work is being farmed out to laboratories such as ADL's because the government has overloaded the existing nerve-gas research facilities in its drive to maintain and improve the United States's war-fighting capability. Harvard University professor emeritus of chemistry and former Pentagon consultant Frank Westheimer speculates that the Edgewood Arsenal, in Maryland, the army's top-secret research and development center for chemical warfare, "is up to its ears with other work and doesn't have any personnel left over to develop new protective clothing and such."

ADL's leadership is well aware of the profits to be made in chemical-warfare work. In 1982 it spent more than \$875,000 to upgrade some of the company's laboratories in order to qualify for contracts involving extremely toxic chemicals. Judith Harris, ADL's manager of chemical and food sciences and the supervisor of the Philip L. Levins Chemical Surety Laboratory, estimates that the company's current contracts involving nerve gas are worth \$500,000. In addition, ADL has placed bids on chemicalwarfare contracts worth at least another \$500,000. Says Harris bluntly, "We would not have made an investment in this lab if we did not think it would be a good, continuous business venture."

-D. G.

the instructions of the lab personnel. They tell us what to do.'

The state DPH report is more specific: "In the event of a fire, [local fire fighters] are instructed to let the lab burn.

Cambridge fire chief Thomas Scott, in a court affidavit, explained: "I have been advised by officials at Arthur D. Little not to enter the laboratory unless accompanied by a chemist trained in dealing with these materials. If the chemists should be injured, incapacitated or killed by an incident in that lab, the Cambridge Fire Department 'may' not have any source of information to deal with the situation."

2:28 p.m.

Trying to get inside the main building, Chief Fox was practically knocked over by the people fleeing in response to the deafening, high-pitched alarm, which could be heard above all the screaming.

"Who's in charge here?" demanded the fire chief, to no avail. Seeing a man in a white lab coat who was shouting directions, Fox collared him.

"Are you the person in charge here?" demanded Fox.

"Are you crazy? No one's in charge," responded the technician. "This is a disaster," he cried, pulling away from the

Fox shoved the man up against the glass showcase in the lobby. "I don't care if a nuclear bomb went off. I still gotta tell my men what to do," he said, staring straight into the eyes of the terrified man.

"Okay, okay. You wanna know? A whole section of Building 15W blew up about 10 minutes ago. There's dead people all over the place. All the chemists up there are probably dead. We're just doing the best we can to try and contain this (Continued on page 114)

thing," the ADL technician said, fighting back tears.

Frank Westheimer explains that in the event of an accident at the Levins lab, an immediate evacuation of the surrounding area might be required. The Cambridge police, notified by an automatic alarm, would oversee the evacuation procedures. "We have no plan for evacuation," says Lieutenant Timothy Toomey of the Cambridge police, in response to Westheimer's statement. "We can control crowds and vandalism," he offers.

2:33 p.m.

Deputy Police Chief Sam Giardini arrived, parked a blue and white Cambridge police cruiser on the shoulder of Route 2, and jumped out. "What've we got here, Jim?" he said, calling over to Officer Owens.

"You're asking me?" responded the beleaguered officer, who was standing in the midst of a bumper-to-bumper traffic standstill. "I was just told there are over 1,300 people who work at this place," he said. "Well, every goddamn one of them just jumped into his car and is trying to hightail it outta here."

Giardini ran toward the main building, where he saw the fire chief surveying the situation.

"We don't know what we can or can't do," said Fox, sweat pouring from his brow. Behind him, smoke billowed out of Building 15W. A veteran of many disasters, Fox was not used to watching a fire burn and being helpless to put it out.

When any toxic chemical is released into the state's environment, local officials are required to alert the Massachusetts Department of Environmental Quality Engineering (DEQE). Jim Coleman, the director of the Office of Incident Response (OIR) of the DEQE Division of Hazardous Wastes, says that "Cambridge officials would deal with" any accident at ADL. "I really don't know what ADL is doing, except what I've read in the papers," he adds. The OIR's responsibility, Coleman explains, is to "deal with companies that deal with hazardous materials and toxic wastes." After a second's pause, he remarks, "Sounds like we should be involved in this, doesn't it? But I guess we're not."

DEQE public affairs officer Myles Brown confirms that it is the OIR's statutory responsibility to "coordinate with other state and local agencies to respond" to a major toxic-chemical accident such as might occur at ADL. Specifically, the office would dispatch an emergency response team to the scene to supervise a "cleanup and containment operation" and to "see that the safety of personnel and residents was ensured."

2:41 p.m.

By this time, fire departments from

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neighboring Belmont and Arlington had arrived at the ADL complex, in accordance with contingency plans that had been made after the Levins lab was built. Chief Fox was in a quandary. With no expert stepping forth from the wreckage to advise him, was he going to risk his men's lives to fight the fire or just let the lab burn, possibly endangering the surrounding buildings and homes? The chief decided that his duty was to protect the community as best he could.

"The ADL people said at those city council hearings that it would be virtually impossible for the steel containers holding the nerve gas to rupture," he told Deputy Police Chief Giardini. "They also said that the heat would destroy the chemicals. I think I've got to bank on that and get my men to work before this fire spreads all over the place."

Frank Westheimer suggests that in the event of even a small leak at the Levins lab, two things would happen: panic among the local residents and preliminary symptoms—such as severe pupil constriction and respiratory difficulty—in the people who had been exposed. He advises that, at the very least, public health precautions should include making sure that all local hospitals are equipped with sufficient quantities of the antidote for nerve-gas poisoning and informing the public of the physical symptoms produced by exposure to a nerve gas.

The state DPH report concluded that "utilization of state of the art equipment should minimize contamination of the environment and reduce the risk of hazard to human health." The report made no assessment of potential risks to the public, nor did it recommend any local public health precautions. But when pressed, the author of the report, DPH chief environmental hygienist Elise Comproni, admits, "If events go so badly [at the lab] that you can't contain them, we're talking about a real catastrophe."

ADL's Triner sounds a reassuring note. "Whatever's in the lab, when burned, is innocuous," she says. But Westheimer disagrees. Under controlled conditions, he says, "the liquid [nerve agents] can burn and be detoxified. However, [if there were a fire,] some would burn and some would become gaseous, boiled into the air. The liquids would [remain] lethal if volatilized [turned into a gas] in sufficient quantity.

"It would," concludes Westheimer, "be a bad scene."

In evidence requested at a community meeting and given several days later to Cambridge resident Ralph Wolfe, ADL director of health and safety Scott Strickoff estimated that in the event of an explosion or fire at the Levins lab, everyone within at least two-thirds of a mile from the lab would be inside the "zone of lethality." The

zone of lethality is defined as the area in which one-half of the people who are exposed to a lethal concentration of nerve gas would die. Within this area lie the 150-bed Sancta Maria Hospital; Children's Village, a day-care center for more than 60 local children; the massive, nearly complete MBTA Alewife station and parking garage; and Route 2, the express route to the metropolitan area for 40,000 daily commuters. At the edge of the zone are the three high-rise apartment buildings of the Jefferson Park complex, home to about 1,000 people, and just down the road is one of Cambridge's largest elementary schools, the Tobin School. With a mild breeze (10 to 20 miles per hour) on a warm, humid day, the zone of lethality could be much larger and uncontainable.

2:46 p.m.

On Dudley Street, a little more than half a mile from all the commotion, six-year-old Jimmy Higgins was playing in his sandbox while his father was inside making lunch. It was a breezy, sunny day. Jimmy's eyes began to hurt; he rubbed them, thinking some sand had blown in his face, and kept on playing. Soon his nose began to run and he began wheezing a little. He got up to go inside, but he was dizzy, and stumbled and fell down. He began to cry.

Joe Wheeler, an elderly man who lived a few houses down, was out taking his usual walk. Wheeler noticed a dull ache in his eyes, and his vision became blurry. He suddenly felt a tightness in his chest, and he began coughing. Saliva was dribbling down his chin. "Oh my God," he said, staggering over to lean on a nearby fence. He thought he was having a heart attack, as his breathing became more labored. By the time his wife saw him from their front window, he had fallen to the ground, fluids running from his nose and eyes. Wheeler muttered something unintelligible and passed out.

Nerve agents enter the body by being absorbed through the skin or inhaled. The gases are colorless and odorless. They act by causing a massive buildup of acetylcholine (a chemical that relays messages to and from the brain) throughout the victim's nervous system. According to the current Department of Defense field manual for chemical warfare, symptoms begin with constriction of the pupils, causing dimming of vision. Then the victim has difficulty breathing as his lungs fill with mucus; he experiences vomiting and involuntary defecation and urination, twitching, convulsions, cramping, paralysis, and ultimately, respiratory or cardiac failure, or both. Death takes anywhere from two minutes, if the dose is very concentrated, to several hours or days, if the concentration is small or cumulative over time. The antidote, atro2:53 p.m.

Joan Millward was the resident physician on duty in the emergency room of Belmont's Sancta Maria Hospital that afternoon. It had been a slow day for the recent Harvard Medical School graduate, and she was hoping to leave early to catch a game of tennis.

The first call came in within 10 minutes of the explosion at the lab. A man phoned to say that his daughter was having trouble breathing and that her nose was running uncontrollably. A few minutes later a second call came in, then another and another. The switchboard opcrator was answering calls back-to-back, and soon the victims began arriving in the emergency room. Most came in cars driven by friends or relatives; some came by ambulance. Millward was puzzled by the symptoms: severe twitching of facial muscles and eyelids; pinpoint pupils; heavy discharge of fluids from the nose and eyes; headaches; a variety of respiratory problems including obstructed airways, heavy bronchial secretions, and constricted breathing; nausea; profuse sweating; drowsiness; slurred speech; and confusion. Within half an hour the emergency room was packed. Millward and her colleagues could only attempt to treat the patients' symptoms—they had no idea what was causing them all. Soon the situation became urgent. Within 45 minutes after the explosion, patients began arriving dead.

The Cambridge commissioner of health and hospitals, Dr. Melvin Chalfen, says that no emergency plan exists to deal with an accident at the Levins lab, but he is concerned that people are getting unduly alarmed about what might happen in the event of an accident. "Risks exist in everything. They must be placed in perspective," he counsels. "I guess I'm suggesting moderation in approach in everything."

ADL officials have stated that Cambridge's Mt. Auburn Hospital is equipped with atropine. But Francis Lynch, president

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of Mt. Auburn, comments: "ADL has the antidotes, and it has some medical facilities there. They would administer the antidote and the patient would come here for further treatment. I don't believe Mt. Auburn has the antidotes." Lynch is confident that ADL, where about 1,300 people work, could deal with an accident involving several of its lab workers, but he could not assess the company's ability to tend to hundreds of victims.

In fact, most American hospitals—among them Mt. Auburn—stock some atropine, which has a variety of medical uses. But hospital officials are apparently unaware of atropine's role as the primary antidote for nerve-gas poisoning.

3:01 p.m.

During the summer program at the Tobin School, about three-quarters of a mile downwind from the Levins lab, a small group of children in the playground were overcome by the same symptoms experienced by numerous others on the nearby streets. Within minutes they began falling to the ground, twitching and gasping. A teacher ran out of the school building as the children, rolling on the ground, screamed in agony. He picked one girl up, but by then she was silent. It had taken a mere five minutes for her short life to be snuffed out.

Back at Acorn Park, Cambridge police chief George Clarke had just arrived. "We put in a call to the people at DEQE to find out what we should do about this," he told Fire Chief Fox. "They said they didn't know anything about it, and told me I should call DPH."

"What did DPH say?" asked Fox.
"They told me to call DEQE," Clarke
answered, staring in disbelief at the battlefield scene around him.

David O'Conner, director of civil defense for the city of Cambridge, explains that there is no specific civil defense plan for an accident at the ADL complex. "The fire department and the police department have done the planning on this," he says. It would be the civil defense office, however, that would coordinate an evacuation if one became necessary. But O'Conner doesn't seem to think that ADL's work poses a serious threat to the community. "There is not a situation there that would require evacuation," he says. "The main risk, as I understand it, is to firemen and personnel at the scene. Within the immediate radius of ADL there is a negligible amount of property, and the company is dealing with a very small amount of chemicals.'

3:14 p.m.

Fire Chief Fox had to make a decision. He was authorized to call for an evacuation of the surrounding area once he had

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assessed the situation. But he was still unable to obtain any qualified advice: the ADL chemists who were supposed to counsel him were either gone or dead, and none of the public health authorities seemed to know what to do. An hour had passed since the alarm went off, and already a number of his men had been hospitalized. But evacuation was a serious undertaking. A broadcasted order to evacuate could cause widespread panic; people might die trying to escape the area. And if he ordered an evacuation, how much of the area would he have to clear out? Would the police be able to implement an order for large-scale evacuation? And what about Sancta Maria Hospital? Should he order it closed and risk having the people in the intensive care unit die from the trauma of transport? He made a layman's assessment: the wind was blowing from the west, away from Sancta Maria. He would order the evacuation of all homes and businesses located within half a mile of the lab, but he would leave the hospital open.

6 p.m.

Cambridge police officers drove through the streets of North Cambridge, broadcasting their eerie message to evacuate as they watched for stragglers and would-be looters. Hundreds had died that day. The heaviest toll was at the ADL complex itself, where many people had never made it to their cars. The Tobin School and the Jefferson Park apartments had also been hard hit by the deadly gases.

Now a morbid calm prevailed in the once-busy neighborhood. The streets were empty; the only movement was the dancing reflection of the flashing blue police lights on the deserted houses and sidewalks. Only the buzz of streetlights and the barked announcement coming from the police loudspeakers cut the thick air. The police officers, wrapped in gas masks and raincoats to avoid absorbing the nerve gas, looked like invaders from another planet. By nightfall they would have supervised the temporary relocation of more than 20,000 people to schools and government buildings in other parts of Cambridge and in Arlington.

"It's inhuman," cried city councillor Al Vellucci at the end of a March 1984 city council hearing. Red-faced, he turned to ADL's chief, John Magee. "You tonight," Vellucci said, "get the blue ribbon for being the biggest con man that ever appeared before this council."

Magee and his aides packed up indignantly. They were confident their legal team would secure a victory for ADL in this battle. ADL would win: the nerve-gas work would go on. □