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MANAGING CRISES IN DEFENSE INDUSTRY: THE PEPCON AND AVTEX CASES

by STEVEN R. LINKE

THE INSTITUTE FOR NATIONAL STRATEGIC STUDIES

A popular Government, without popular information, or the means of acquiring it, is but a Prologue to a Farce or a Tragedy; or, perhaps both. Knowledge will forever govern ignorance; And a people who mean to be their Governors, must arm themselves with the power which knowledge gives.

—James Madison to W.T. Barry
August 4, 1822

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Managing Crises in Defense Industry: The Pepcon and Avtex Cases

MANAGING CRISES IN DEFENSE INDUSTRY: THE PEPCON AND AVTEX CASES

By STEVEN R. LINKE

National planning for the expeditious recovery and expansion of essential industrial production facilities is often geared only to large-scale declared emergencies. Under the worst scenario of a global war, all necessary authorities and funding are assumed to be available. But more often, lesser emergencies require responses without the broad powers and commitment associated with a declared national emergency. A real emergency can provide insight into the appropriateness of planned management approaches and the adequacy of available authorities. This account of two actual emergencies provides lessons on how statutory procedures could be improved, regulations clarified, the government data base expanded, and steps taken to speed up the process to be followed in the event of other crises.

In May 1988, the United States lost half of its capacity to produce ammonium perchlorate when explosions and fire destroyed one of the two producing plants. Ammonium perchlorate is the oxidizer essential to solid-fuel rocket motors. Here, without question, was an excellent test case. Existing ammonium perchlorate had to be carefully allocated and additional production capacity was needed; numerous ongoing production programs for both strategic and conventional systems needed the product, and some would be curtailed if sufficient ammonium perchlorate was not available. This paper documents the government's actions and decision-making process in dealing with various legal and administrative hurdles in both restoring the capacity and allocating available ammonium perchlorate.

The examination of the Nevada plant emergency serves as a case study that not only illustrates how government

organizations took action to correct this problem but also suggests how they might function in a large-scale emergency. After providing some background to the incident, the paper deals with four issues in more depth:

— Financing of the recovery and expansion of defense production in an emergency;
— Balancing of the safety and environmental laws and concerns with those of national security;
— Management roles and decision-making at the national level;
— Allocations of the critically short material among defense and other users.

In a second and related case, Avtex Fibers—the sole source of long-fiber rayon used in rocket motors and reentry vehicles—stopped production in 1989 for financial reasons. This case is examined and, whenever appropriate, compared with the issues in the PEPCON case.

The PEPCON-Kerr McGee Case

On May 4, 1988, the United States lost nearly half its production capacity for ammonium perchlorate when explosions and fire destroyed the Henderson, Nevada, plant of Pacific Engineering and Production (PEPCON). Ammonium perchlorate is the oxidizer that constitutes the bulk of the fuel in our large solid-fuel rocket motors and numerous smaller conventional missiles.

Although the threat to national security was the problem in a larger sense, the initial news stories about the 4 May 1988 PEPCON explosions in Henderson, which registered 3.5 on the Richter scale of California earthquake seismographs, focused on the injuries and destruction. The explosions leveled the PEPCON plant as well as other nearby structures and blew out windows for miles around. Injuries from the explosions were surprisingly light: two people were killed and 350 people were treated for injuries.

Caring for the injured and repairing damage to the surrounding community were the immediate concerns. The town

took action to recover and to prevent a recurrence. Meanwhile, the only other domestic producer of ammonium perchlorate, Kerr McGee Chemical Company, located approximately two miles away in the same town, closed briefly and then reopened after a self-assessment showed no significant safety problems.

State and local officials requested emergency disaster assistance from the regional Federal Emergency Management Agency (FEMA) office. Individual private insurance covered most physical damage to property, but some other losses, such as insurance deductibles and business closings due to building damage, were not covered by insurance. What items were covered by insurance and what could be documented as a true loss was important in trying to convince FEMA that the emergency warranted Federal help. After assessing the physical damage and determining the uninsured portion to be well within the financial capability of the state and local community, FEMA denied the request for disaster assistance. This decision was consistent with the normal interpretation of the Federal Disaster Relief Act (P.L. 93-288), which allows federal agencies to provide federal *supplemental* assistance when the need for help is beyond the capability of state and local governments.

Although the local citizens, with the assistance of their congressional representatives, appealed this decision and received two additional inspections by FEMA representatives, the decision remained unchanged. One reason the local people and their congressional representatives fought so hard to get assistance from the federal government appears to have been that the explosion affected so many people, even if the financial impact was relatively slight. Another reason appears to have been concern that the Kerr McGee plant nearby also might explode. Government safety experts said that such concern was unfounded because, under normal manufacturing conditions, ammonium perchlorate would not explode. The cause of the PEPCON explosion remains unclear, however, more than a year later.

During the explosion several piles of ammonium perchlorate exploded and a large gas main running under the plant

also ruptured and exploded. PEPCON claimed the explosion was started by a leak from that gas main which caught fire and was then fueled by the ammonium perchlorate. The operating gas utility blamed ammonium perchlorate, and said their gas main was damaged as a result of the ammonium perchlorate explosion. No final judgment on the cause of the explosion has yet been formulated by the government; although theories have been developed, the final decision will rest with the courts. Lawsuits by insurance companies against PEPCON are pending and, together with the operating gas utility, these companies are still trying to define their respective liabilities.

Political strategies of those running for office in Nevada may have also played a role in why FEMA's ruling was contested. Some of the government participants felt that, because there was an ongoing campaign for Nevada's representative to the US Senate, this issue provided a timely opportunity for additional visibility for the governor, who was in the campaign, as well as his opponents.

The issue of disaster relief was not completely resolved for nearly two months. To help assuage the community's reaction, Kerr McGee privately cosigned loans to assist local citizens with uninsured damages. But their help was more gesture than substance: the total obligation was limited to $250,000 which didn't go far in correcting the $10-30 million loss which the local community claimed was the extent of the damage.

Initial Management Actions in Response to the PEPCON Emergency

The National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD) quickly recognized the importance of the loss of ammonium perchlorate manufacture to their production programs and prepared estimates of the situation by the day after the explosion. This was quick action considering the multitude of programs and agencies involved. NASA had a head start on this issue because several years before, they had gathered detailed data on manufactures' capability to expand production when

considering an acceleration of the space shuttle program. NASA was therefore aware that the only US manufacturers of ammonium perchlorate were PEPCON and Kerr McGee.

Within DOD, the Air Force, (whose Peacekeeper, Titan, and other programs, ranging from Delta rockets to explosive charges for ejection seats, depended on ammonium perchlorate) took the initiative on the day after the explosion to analyze and report on the incident. It estimated the total gross requirements for ammonium perchlorate at approximately 60 to 70 million pounds per year (MPY) and maximum capacity at Kerr McGee, the remaining producer, at only 40 MPY. (See page 8.)

Because of the importance of ammonium perchlorate to Air Force programs and perhaps because of the Air Force's initial analytical work, the Office of the Secretary of Defense (OSD) appointed the Air Force as the lead service to work on the problem with NASA. It was to be a more than full-time job for several Air Force staff members for nearly six months.

Two levels of management oversight were formed. At the agency level, DOD and NASA worked on the problem daily with two overlapping committees. At the national level, the National Security Council (NSC) chaired a broader interagency committee to oversee policy and political issues. The Ammonium Perchlorate Advisory Group, composed of DOD and NASA representatives under Air Force leadership, was formed to restore US production capacity. The members of this group had been trained in acquisition and focused on the business management of the problem.

These same people, plus representatives with operational backgrounds from the Office of the Joint Chiefs of Staff (JCS) and the other armed services, formed a separate allocation group to make decisions regarding available stocks of ammonium perchlorate. Navy and Army representatives presented their requirements and helped decide how to distribute the available ammonium perchlorate. (Department of Transportation representatives later joined the group to speak for commercial space launch requirements.) To avoid the appearance of bias, this Ammonium Perchlorate Allocation Group was chaired by OSD instead of the Air Force. So there were two

Table 1

AMMONIUM PERCHLORATE DEMAND AND US PRODUCTION CAPACITY
May 1988
(Millions of pounds)

Estimated Requirements

	1988*	1989	1990	1991	1992
US Government					
Army	9.3	14.0	11.7	9.1	9.1
Navy	3.7	6.5	5.4	5.1	5.1
Air Force	10.0	11.5	16.1	12.9	10.0
NASA	6.8	19.8	22.1	24.2	28.0
Subtotal	29.8	51.8	55.3	51.3	52.2
Other					
Commercial	3.5	3.7	5.2	.4	1.0
European MLRS**	1.8	2.6	5.3	5.3	7.0
Other export	1.0	2.0	2.0	2.0	2.0
Total Demand	**36.1**	**60.1**	**67.8**	**59.0**	**62.2**

Estimated US Production Capacity

	On May 4	Maximum
Kerr McGee	32	40
PEPCON (before the explosion)	20	40
Total Capacity	**32**	**40**

Source: USAF briefing to OSD's Under Secretary for Acquisition, *Ammonium Perchlorate, Recovery Status Report,* 3 June 1988. These figures are slightly different from the 5 May 1988, *estimates,* but portray the same relative shortfall of Ammonium Perchlorate.

*The 1988 requirements are for the remainder of the year.

**Multiple Launch Rocket System

MANAGEMENT STRUCTURE FOR HANDLING AMMONIUM PERCHLORATE EMERGENCY

Ammonium Perchlorate Interagency Group (chaired by National Security Council Staff)

Membership: Varied with the specific topic at each meeting, but generally consisted of National Aeronautics and Space Administration; Federal Emergency Management Agency; Office of Management and Budget; and the Departments of Defense (Office of the Secretary of Defense, Air Force), Commerce, State, and Transportation. On the Avtex issue, discussed later, the Department of Justice and the Environmental Protection Agency were added.

Task: To review the planned actions and allocations of the DOD-NASA chaired groups, ensuring that recommendations were consistent with administration policy and bringing in and coordinating the participation of other agencies as needed.

Ammonium Perchlorate Advisory Group (chaired by Air Force)

Membership: National Aeronautics and Space Administration, Office of Secretary of Defense, Army, Navy, Air Force,

Task: To restore the US production capacity for ammonium perchlorate and manage related issues other than allocation.

Ammonium Perchlorate Allocation (chaired by Office of Secretary of Defense)

Membership: Same as Advisory Group plus Office, Joint Chiefs of Staff and later, Department of Transportation,

Task: To allocate existing stock term production of ammonium perchlorate among defense, and allied requirements.

NASA/DOD groups with slightly different membership, different chairmen, and different responsibilities for the PEPCON emergency. Although we would expect one of the groups to be in charge overall, this was not the case according to group members. There was no hierarchical relationship between these two groups. They simply focused on different aspects of the same problem. There was no problem with coordination because the membership in both was the same.

The higher-level Ammonium Perchlorate Interagency Group, chaired by National Security Council (NSC), staff was

formed to oversee the NASA/DOD groups. Although at first glance this Interagency Group might seem redundant, it played an important role, dealing with general policy questions and bringing in other agencies, like the Department of Justice, to assist when necessary. The NSC staff began guiding action very early. The first NSC internal memo on the subject noted that an interagency meeting was held on 11 May, only 1 week after the explosion, with DOD and NASA cochairing the effort.[1] Although this memo implied that NSC was only observing the process, NSC was doing much more. The memo stated "We will reconvene in 3-4 weeks to assess... [progress]" and "We may have to allocate among DOD, NASA, commercial, and foreign requirements." Even at this early stage, NSC recognized potential conflicts with commercial requirements as well as the requirements of allies and, over the next few meetings, demonstrated that it intended to guide government actions during the recovery process.

On 12 May, Kerr McGee, in reaction to local pressure, closed down for a second safety inspection; this time it remained closed for nearly a month. Fearing another explosion, many residents wanted the remaining plant in Henderson closed permanently.[2] With the only remaining producer closed down, even temporarily, the government carefully monitored the status of the plant reinspection and prepared to counter any objection to reopening based on emotion rather than facts.

On 19 May, NASA's administrator met with the NSC staff to discuss FEMA's denial of disaster relief and the prospects for replacing the PEPCON plant. NASA tried to impress on the NSC staff the importance of resolving what it saw as a small problem delaying future shuttle launches. NASA suggested that the government appease the local community by declaring Henderson a disaster area. Such a declaration would have allowed government assistance in rebuilding the damage caused by the explosion.

From the standpoint of cost alone, NASA's administrator was right; it was sensible to make every effort to reestablish ammonium perchlorate production. Even 2 or 3 shuttle

postponements (NASA had enough ammonium perchlorate for 5 or 6 launches of the 8 that were scheduled) was too much to risk. Although the cost of delaying a launch is difficult to estimate, the cost of a launch offers a useful perspective. Depending on the payload, the cost can easily be $500 million or so. Henderson wanted less than $10 million in low-interest loans. Building a new ammonium perchlorate plant was estimated to cost $50 million to $60 million.

However, NSC, which believed that Kerr McGee would soon reopen, supported FEMA's decision to deny disaster relief. Soon afterwards, however, FEMA initiated a second review.[3] This second review was in response to pressure from several sources, not just a result of this NSC meeting. NSC made the point during the meeting that action on rebuilding the PEPCON plant was, in fact, awaiting DOD and NASA agreement on an approach. NSC assured NASA's administrator that, once the two organizations had agreed on an approach, any new construction could be expedited under the authority of the Defense Production Act.

Consideration of Alternatives

The Air Force and NASA began sorting through alternative ways of expanding production capacity. On 16 May, PEPCON proposed government support of financing to rebuild the plant with a 30 million-pound capacity. On 18 May, Kerr McGee proposed instead that it build a second 40 MPY capacity plant. There were obvious disadvantages associated with both contractors' plans. PEPCON was near financial collapse, especially in view of lawsuits related to the explosion, but the Advisory Group was reluctant to have Kerr McGee become the single source for this product. Moreover, citizen reaction remained hostile to any plant in Henderson. Therefore, the Advisory Group informally asked other large, financially healthy chemical companies that had

experience with ammonium perchlorate production whether they would be interested in manufacturing ammonium perchlorate.

Two US companies that had previous experience with ammonium perchlorate, Occidental International and Pennwalt Corporation, were not interested, with or without government loan guarantees. Neither had existing facilities to handle a hazardous product, and both had lost their technical expertise to make ammonium perchlorate. The search for another financially healthy domestic supplier came up with one potential source. Olin Corporation expressed interest in two possibilities. The first, a joint venture, was rejected by PEPCON. The second was to start from scratch, building a new facility and qualifying the product as acceptable, which would take between 24 and 48 months.

A Japanese company, Mitsubishi, expressed interest in supplying ammonium perchlorate to the United States, but it also would have had to expand production facilities. Moreover, Mitsubishi's ammonium perchlorate was, according to NASA, 5 times as expensive as the US-produced product and inferior in quality.[4]

The Advisory Group then turned its attention to PEPCON, first because it desired 2 separate sources of ammonium perchlorate for national security and for competition, and second—and more important—because reviving PEPCON appeared to be the fastest way to get the additional capacity. PEPCON had salvaged some equipment from the old plant. It also had done some design work for a new facility, because it had recently assisted overseas firms with designs and thus had been through the process of considering newer, alternative equipment. PEPCON's recent experience in making ammonium perchlorate was also important, because this expertise could speed up the requalification process.

NASA believed that it was appropriate to provide contractual incentives to assist PEPCON with the rebuild. In the early 1980s, NASA had used financial incentives to foster the expansion of both PEPCON and Kerr McGee, guaranteeing recovery of investment and allowing the companies to add a direct per-pound charge, in addition to the price of

ammonium perchlorate. Thus, these companies had more than tripled their production respectively, from 5 million and 12 million pounds per year to their May 1988 levels.

On 3 June, the Ammonium Perchlorate Advisory Group briefed DOD management on options for expanding production, covering several questions related to the extent and nature of possible government help:

- Should there be multiple sources?
- Should the government rely on private producers without adding government contractual incentives?
- If the government should add incentives, how much and of what type should they be?
- Should a government-owned production facility be built?

Because so many important space and defense programs depended on continued supply of ammonium perchlorate and because 90 percent of ammonium perchlorate was consumed either directly or indirectly by government programs, the agencies believed that some government involvement was warranted.[5]

The briefing estimated the annual shortfall through at least 1994 at around 20 MPY; without additional production capacity, existing stocks would run out by mid-1989 and begin causing production breaks for major programs. These estimates assumed that Kerr McGee would resume production in June 1988, at the rate of 40 million pounds per year. (Resolution of the safety issue did allow the plant to reopen in mid-June.) DOD and NASA were busy developing detailed figures on what foreign countries produced and used, but correctly estimated those foreign production and consumption figures to be small. The United States remained the principal producer and consumer of ammonium perchlorate in the world.

The Advisory Group considered 4 options, ranging from expanding the remaining source, Kerr McGee, to creating

a government-owned, contractor-operated facility similar to most munitions plants.[6] The options discussed were as follows:

Retaining the Kerr McGee facility at Henderson and building a duplicate facility at a remote site with private financing. This option was estimated to take from 15 to 24 months depending on the premium that the government was willing to pay to expedite construction. Although Kerr McGee could provide its own financing, it asked for government assistance in the form of an investment protection guarantee. This assistance would take the form of guaranteed buys over the next 5 years, allowing recovery of capital through a direct surcharge on each pound of ammonium perchlorate produced.

Rebuilding the PEPCON facility at a remote site, encouraging private financing by guaranteeing government purchases and indemnifying, if necessary, to help them get financing.[7] This option had the most optimistic schedule, possibly starting new production in January 1989. PEPCON had recently helped to design plants in foreign countries and therefore had much design work available.

Establishing a new source through competitive procurement. This option had the longest time estimate, with 4-6 months required for source selection and 24-48 months for construction. Government assistance was also likely in this case.

Establishing a government-owned and operated arsenal or contractor-operated type of operation. This option required government capital investment and 24 to 48 months to complete. The requirement to complete an environmental impact statement prior to requesting budget approval caused the longer time estimate compared to options one and two. If a private facility were built without competitive source selection, however, that administrative lead time could be avoided. Moreover, although state and local environmental laws would still have to be followed, the necessary permits could be obtained while construction proceeded, so there would be no serious schedule delays.

Deciding on a Recovery Plan

DOD's Under Secretary for Acquisition, Robert Costello, decided to adopt both of the first two options: expanding the existing source, Kerr McGee, and rebuilding PEPCON. The long-term goal was to move both from Henderson to a separate, more remote site. The government guaranteed both contractors' recovery of their investment by allowing a surcharge on each pound of ammonium perchlorate sold and amortization of equipment cost over a 5-7 year period of 20 MPY for PEPCON and 30 MPY for Kerr McGee. Government representatives believed the PEPCON facility should be ready by mid-1989, minimizing the shortfalls.

The Advisory Group decided to pursue private financing, with the associated minimal government involvement, as opposed to direct government investment or loans, because approval of private financing was estimated to take only about 4-6 weeks. Getting approval for any financing with more government involvement depended on showing that private financing was not available and then getting the necessary approvals, a process that was projected to take well over 60 days' time. First, the supplemental budget request would have to be staffed through DOD and the Office of Management and Budget (OMB). Then Congress would have to be notified in time to allow appropriation and authorization committee review.

While the Federal Government decided on a recovery plan, Congress held hearings on the issue. Specifically, the Subcommittee on Investigations and Oversight of the House Committee on Science, Space, and Technology reviewed the ammonium perchlorate issue in hearings on 8 June and 24 June. They held the first hearing in Washington and focused primarily on the government's recovery plan with some discussion of disaster relief. The chairman, Representative Robert A. Roe, mentioned the possibility of a declaration of a national emergency; on 13 June, he sent a letter to the President urging him to overrule FEMA and grant disaster relief to Henderson.[8]

The second congressional hearing held in Henderson on 24 June, focused entirely on the issue of disaster relief. At the same time, FEMA representatives were on-site to begin their third and final review of Henderson's request for disaster relief. While the committee held its hearing, FEMA representatives met directly with local organizations, but Henderson was still unable to document financial claims in the amounts required for declaration of disaster. So the local community was left on its own which resulted in bitterness, despite the repeated FEMA reviews and Congressional hearings.

In the first hearing, NASA and DOD expressed confidence that their recovery plan would succeed if Kerr McGee were promptly reopened. In line with that timetable of NASA and DOD, Kerr McGee restarted production of ammonium perchlorate on 13 June. With that production facility back in operation and reasonable prospects for private financing of a second PEPCON facility, attention focused on allocating available production from Kerr McGee for near-term requirements. Long-term DOD requirements (for 1989) were still hard to pin down. The Department of Transportation continued to work on firming the estimates of commercial space-industry requirements.

On 28 July, Cedar City, Utah, about 200 miles from Henderson, approved all site permits for construction of the PEPCON facility there. This was good news and an important step in getting both plants production moved outside of Henderson. The news about private financing for the new facility was less favorable. PEPCON's loan application fell through with first one bank and then a second bank, each after several weeks' review. Negotiations with the second bank, which was Japanese, broke off in September when that bank asked for unreasonable stipulations. Initially, this bank had asked that the US government finance the construction phase, with the bank refinancing upon completion of construction. Later it changed its terms to lending only half the money required by PEPCON for the project and forbidding PEPCON to sell to DOD.

A commitment letter was obtained from a third bank in September 1988, and the new closing date was targeted for

November 1988. While awaiting loan approval, the government's internal staff work remained focused on allocation of available ammonium perchlorate. During this period DOD considered the availability and suitability of foreign-produced ammonium perchlorate but rejected the idea of importing because no foreign productive capacity existed that could satisfy US demand. France, Japan, Brazil, and even the Soviet Union were possible sources, but their production was already committed to domestic or other international customers.[9] In a broader sense, the long-range goal was to get US suppliers producing at required levels again, without encouraging foreign competition. Foreign competition played a role in another decision, this one to help the US commercial space industry.

In October, FEMA gave the commercial space industry official rating status as essential to national security, allowing it to obtain ammonium perchlorate through the government-controlled allocation process. The organizations and issues involved are discussed in more detail later.

One last issue tied up PEPCON's loan approval in early 1989 when PEPCON's involvement in exporting ammonium perchlorate to Iran was made public. The news media reported that prior to the explosion, in January 1988, PEPCON had sold approximately 300,000 pounds of ammonium perchlorate to dealers who eventually consigned the chemical to Iran. US Customs in Rotterdam seized the chemical in February 1988, before it could be put aboard a ship headed for Iran. As a result of a court decision, the seized ammonium perchlorate eventually returned to the United States, where it was allocated to MLRS production. PEPCON's financing arrangements were held up for several additional weeks over this issue, but they were eventually completed on 28 March 1989.

Construction of the new PEPCON facility was completed in July 1989, with the first ammonium perchlorate produced that same month. Construction of the new Kerr McGee facility was scaled back. Only the hazardous operations were moved from Henderson to the remote location. Raw materials are to be trucked to the remote site for blending and storage prior

to shipment. Until the output from the new PEPCON plant is at a sufficient level of quality and quantity, the allocation problem will not be over. At least one additional program was affected when a Titan launch was postponed in early 1989 because of a lack of ammonium perchlorate. In general, allocation proved to be less of a problem than first anticipated because ammonium perchlorate in working inventories at Kerr McGee and at the rocket motor manufacturers provided the necessary operating margin.[10]

Background on the Avtex Fibers Case

In late October 1988, the United States faced a similar situation when another manufacturer in Front Royal, Virginia, announced it would cease production. Avtex Fibers is a sixth-tier subcontractor for long-fiber rayon, a necessary material in the fabrication of carbon-phenolic blankets used to line the nozzles of rocket motors, ablative heat shields used for reentry vehicles, and various seals used in high-temperature applications. A sole-source producer, supplying the same propulsion systems, Avtex actually ceased production on 3 November 1988, creating a situation similar to that involving PEPCON. The shutdown was caused not by an explosion but by internal financial problems aggravated by the need for funding to correct safety and environmental problems repeatedly cited by state agencies. Because the problem was similar, it was handled by the same management committees that worked on the ammonium perchlorate issue. As with ammonium perchlorate, the production schedules of major systems depended on availability of the product. Once again, the government had to take action to keep a vital supplier in operation. Once again, the government had to calculate requirements, coordinate with state agencies on safety (and, in this case, environmental issues), and help the company financially.

Avtex Fibers needed approximately $38 million to reopen its plant and restart production. The Avtex situation was much more time-sensitive than the need to rebuild PEPCON, first, because the liquid wood pulp was hardening in the

production equipment and, second, because Avtex was a sole-source supplier. Until another source of this rayon was qualified as acceptable, which would be a lengthy and costly process, Avtex had to be kept going.

Of the total Avtex production output, less than 10 percent was the critical long-fiber rayon. However, the plant had to operate at full capacity to be able to produce the special rayon. So the goal was to get it back into full operation. NASA and DOD purchased approximately equal shares of this long-fiber rayon production and, therefore, similarly split the cost of the financial rescue. Because the use of the rayon was split between NASA and DOD, as in the case of ammonium perchlorate, it seemed appropriate for the same management groups to deal with the problem. This time, the government management groups responded more quickly because the groups were already in place, and they considered this problem something of a subsidiary of the ammonium perchlorate problem. The Avtex issue was managed by the same process as the PEPCON incident. The Interagency Group took on Avtex as an additional issue, adding representatives from the Environmental Protection Agency and the Department of Justice. Once again, the NSC staff guided the agency actions; FEMA did not coordinate responses.

Another reason for quick response was that part of the requirements calculation had already been done. Actual production schedules of end items were known; these were virtually the same as those using ammonium perchlorate. Government managers had only to determine the amount of aerospace-grade rayon used in producing each of those systems and multiply by the numbers planned for production.

Unlike the ammonium perchlorate situation, the shutdown of the rayon-fiber plant required immediate action to restart production. With the liquid wood pulp already hardening, if production did not quickly resume, some of the equipment would have to be replaced, causing further delays and adding to the restart costs.

National attention was brought to bear on the issue. On 19 November 1988, the government announced federal assistance, primarily financial, coordinated by the NSC staff,

to Avtex Fibers.[11] This assistance helped resolve the issue of aerospace-grade rayon in less than 3 months. The financial health of Avtex continued to be of concern, with the plant finally closed for good in early 1990, again for safety and environmental reasons.

Major Issues In Both Cases

The PEPCON explosion in Henderson, Nevada, and the Avtex corporate crisis drew attention to 4 major issues:

— Financing of the recovery and expansion of defense production in an emergency.

— Balancing of safety and environmental concerns with those of national security.

— Management roles and decision making at the national level.

— Allocations of critically short material among defense and nondefense users.

Financing the Recovery and Expansion of Defense Production in an Emergency

PEPCON initially estimated that construction of its new plant would cost $33 million and require 6 months' time. Upon advice from NASA and DOD, the cost estimate was increased to a more realistic $50 million to $60 million and the time estimate to 1 year. This higher cost and longer time estimate allowed for additional safety costs such as wider spacing between buildings, the associated longer utility runs, and more money reserved for contingencies.[12]

Obtaining financing for the new facility turned out to be a lengthy process. Normally, to finance new construction, a contractor would simply apply to private financial institutions. According to recent reports, projected reductions in

defense spending, among other things, have made this course more difficult, especially for defense industries below the prime-contractor level.[13] Perhaps for the same reasons, PEPCON had experienced difficulty in getting private financing even before the explosion. After the explosion PEPCON had an additional liability: the risk of lawsuits from the explosion.[14] Some form of financial backing from the government was in order. Options ranged from direct loans to guaranteed recovery of investment through guaranteed purchases.

OMB policy, as outlined in its Circular No. A-70, dated 24 August 1984, states that agencies will provide credit assistance only when necessary to achieve objectives. It also specifies that loans and loan guarantees must be authorized in the annual budget or a supplemental appropriation.[15] According to DOD and NASA participants on the Ammonium Perchlorate Advisory Group, that group never seriously considered government loans or loan guarantees as a way to finance the PEPCON rebuild, because of the time that would have been required to meet the requirements of the Office of Management and Budget (OMB) and to get necessary congressional approval.

Reports differ regarding what OMB representatives said during the Interagency Group meetings about the use of these loans and loan guarantees for the PEPCON case. OMB staff members recall saying that it was premature to propose loan guarantees at the outset and that they discouraged commitments to loan guarantees in discussions with the private sector without administration review or approval. DOD and NASA members claim that OMB staff said that OMB would oppose loans and loan guarantees until the alternative of private financing had been thoroughly explored. NASA and DOD understood loans and guarantees to be possible, but only as a last resort.[16] Even if OMB concurred, additional time would be necessary to get a budget amendment approved by the 4 authorizations and appropriations committees. DOD and NASA, therefore, virtually ruled out loans and guaranteed loans, and such loans were not among the options presented to NASA and DOD management on 3 June.[17]

The Ammonium Perchlorate Advisory Group perceived private financing to be the fastest way to get construction of a replacement facility started, but most banks were not interested in lending money to PEPCON. One that at least expressed interest estimated the loan application process could be expedited, requiring only 30-60 days. To persuade the bank to commit, the government offered certain investment protections, authorized by the Federal Acquisition Regulation (FAR). Specifically, NASA used contracts with Morton Thiokol, the prime contractor, to provide these incentives and advance payments to PEPCON, a subcontractor. NASA guaranteed amortization of PEPCON's investment and allowed direct charges for each pound of ammonium perchlorate produced over a 7-year period. (This arrangement differs from a loan guarantee in that if there is no production, or if ammonium perchlorate is not produced at a profit, the loan, as with any normal private sector loan, could still be defaulted.)

These incentives were not enough to spur private financing. An NSC internal memo of 9 September summed up this key issue in one sentence: "Financing has taken longer than anticipated due to reluctance in the banking industry to finance a new ammonium perchlorate plant without a federal loan guarantee and other protection." As mentioned earlier, even with government investment incentives, private financing arrangements fell through with first one and then a second bank because of PEPCON's perceived financial weakness. In September, PEPCON applied to yet a third bank. The loan was completed on 28 March 1989, 8 months after the first estimated closing date with the first bank.

Meanwhile, NASA acted to keep construction on schedule. In October 1988, NASA made an advance payment of $11 million against future deliveries of ammonium perchlorate to PEPCON. In February 1989, NASA advanced an additional $10 million. These advances served to allow progress on design, site survey, and procurement of long-lead-time equipment while PEPCON waited for private financing. NASA plans to retain title to new equipment as collateral until a private bank approves new financing,

allowing repayment of the advances. Although what NASA did was referred to by NASA and others informally as a "bridge loan," it was not a true loan, which, as mentioned, would have required OMB and congressional approval.

When PEPCON needed additional money beyond the 2 NASA advances, Chemical Systems Division of United Technologies loaned PEPCON an additional $7 million. PEPCON will repay this loan when the NASA advance payment is repaid.

Two lessons in government finance emerge from these events. The first:

> Although US government agencies lack adequate authority to provide timely loans, even in emergency situations, agencies can work around this limitation.

Administration policy is to encourage and supplement private lending activity only when necessary to achieve objectives, in this case, to establish a production capacity. Agencies are to displace private lending activity to the smallest degree possible. Current policy interpretation makes it difficult for the government to make direct or guaranteed loans in an emergency. NASA found it more expedient to use FAR provisions for advance payments to PEPCON.

If NASA had had the authority to guarantee a loan or to make a direct loan for even a limited amount, it might have been possible to avoid the PEPCON loan tie-up. With a government guarantee, private financing could probably have been secured much earlier. Considering the exceptional nature of the case, the government might have done well to have loaned the money directly to PEPCON.

Similarly, NASA and DOD used two separate authorities to get the necessary capital to Avtex. Each felt most comfortable with its own, familiar approach for doing this. According to conversations with the Air Force staff, no loans of any kind were appropriate in this situation because, as was not the case with PEPCON, the money for Avtex was to be used for operating expenses, repairs, etc. An additional loan with

the attendant liability for repayment would mean additional financial liability. This obligation would necessarily make suppliers more wary about getting their payments and could have inhibited necessary credit. Instead, NASA used contractual arrangements, through Morton Thiokol, to provide an arrangement similar to NASA's agreement with PEPCON, including advance payments and repayment of those advances with product deliveries.

NASA first advanced a total of $18 million under FAR provisions for payments against future deliveries of rayon. NASA received a commitment that, if Avtex failed to obtain additional necessary financing from other sources or failed to produce rayon for any reason, NASA would get licensing rights to the rayon, which would facilitate the arrangement for production by an alternative source which would then have to be qualified. Starting with the $18 million advance, NASA also paid an increased price per pound. This premium was to eventually amount to $18 million above and beyond what NASA would have paid for rayon at prices in effect before the plant shut down.

To complete the financial rescue, the Air Force—acting as agent for DOD—used the authority of P.L. 85-804, the National Defense Commerce Act, to provide $20 million directly to Avtex; in return, Avtex resumed production.[18] The contract required Avtex to enter negotiations for repayment if it returned to financial health. Because it paid the money separately from production contracts, the Air Force expected no significant change in the contract price of rayon for DOD.[19]

A quick review of P.L. 85-804 is instructive. This law provides certain powers to department and agency chiefs to make or amend contracts when invoked by the President. It was invoked by Presidential Proclamation No. 2914, 15 Federal Regulation 9029 (1950), which dates back to President Truman and is still in effect. The authority was expanded by President Eisenhower in Executive Order 10789. The law and the implementing order give the agency chiefs power to make or amend contracts if they determine that such action is necessary in the interest of national security, subject only to certain

non-waivable rules. These fairly customary rules prohibit certain actions in government contracting, such as no cost-plus-percentage-of-cost contracts and no procurement in violation of existing laws. None of these rules prevented use of P.L. 85-804 in the Avtex case. Thus, a second lesson in government finance is:

> P.L. 85-804 (the National Defense Commerce Act) is an authority not familiar to the emergency planning community. Participants in this case found that the law provides additional authority to make or amend contracts in extraordinary circumstances.

The evidence in these cases indicates that managers responsible for obtaining financing to encourage quick expansion of defense manufacturing capacity should look not to the Defense Production Act authorities for loans but to FAR provisions and to P.L. 85-804 for both advance payments and for authorities to amend contracts. This conclusion is applicable when money is available within existing budget authority for reprograming to the effort. If additional budget authority is needed, a budget amendment with probable attendant delays is still necessary.

State Safety and Environmental Laws Versus National Security

The federal government cannot easily waive state safety and environmental requirements in emergencies. It must adhere to certain administrative or regulatory procedures. With regard to safety, applicable laws provide for waiver, but the waivers require public notification and hearings.[20] The decisions to implement them are influenced heavily by public perceptions.

For the ammonium perchlorate case this statement was especially true. For a short time it appeared that there might be a formal confrontation between the federal and Nevada governments over national security versus safety. News articles cited "concern in Congress that local . . . injunctions might keep the [PEPCON] plant closed" and the possible need to invoke emergency power to open the necessary source of ammonium perchlorate.[21]

To recapitulate, immediately after the 4 May explosion at PEPCON, Kerr McGee closed its plant for a self-inspection. It reopened when its assessment revealed no serious problems. On 12 May, it closed again, bowing to public sentiment and agreeing to pay for an independent review. This time the review was by a state-chartered blue ribbon panel of safety experts. Safety at Kerr McGee was everyone's prime concern: loss of the second plant to an explosion would have been very serious, especially to national security. Although everyone involved wanted safety problems resolved, closing the Kerr McGee plant for a safety review meant that less ammonium perchlorate was available for use; the longer the plant stayed closed, the less ammonium perchlorate was available.

In anticipation of a local injunction that might try to prevent Kerr McGee from reopening, even after any safety concerns were reasonably resolved, DOD and NASA asked the Department of Justice to help. After informing the US Attorney's office in Nevada of its plan, Department of Justice lawyers worked directly with Kerr McGee's lawyer at the Henderson plant to prepare classified and unclassified affidavits outlining the possible effect on national security. These affidavits, which were based on data from NASA and DOD, were not tied to any particular law, because no one knew whether the community would cite the Occupational Safety and Health Act (OSHA), fire codes, or some other law to keep the plant closed. The Department of Justice sent the unclassified affidavit directly to the Kerr McGee plant lawyer at Henderson, so that it could be filed quickly if needed. The Department of Justice also desired that any hearings on the matter be held in federal courts, where national security concerns would get needed emphasis.[22]

The blue-ribbon inspection disclosed deficiencies in plant operations that Kerr McGee promptly corrected. One of the panel's recommendations was to review the hazard rating given to ammonium perchlorate by the US government. US munitions safety experts do not classify ammonium perchlorate as an explosive, but some foreign governments do. Although, as an oxidizer, ammonium perchlorate is technically not an explosive, the plant explosions and extensive blast damage argued

for a more intuitive categorization. Whether ammonium perchlorate requires special handling as an explosive is being studied by a special research team under the guidance of the Ammonium Perchlorate Advisory Group. Tests to date have supported the view that it is not an explosive, only a powerful oxidizer that requires a fuel source, which ammonium perchlorate then enhances. The results of the team's investigations regarding safe transportation were formally reported and accepted by the cognizant agency, the Department of Transportation. Review of the storage and handling characteristics is still going on.[23] As a prudent measure, the new facilities were designed as if ammonium perchlorate were an explosive material; the space between the buildings has been widened, and the plant is located well away from population centers. Of the more than $60 million estimated cost, $15 million is, in fact, attributable to additional safety requirements.

The ammonium perchlorate case demonstrated an approach taken by government to resolve national security versus safety. Two lessons emerge concerning safety and environmental laws versus national security:

> National security can preempt safety concerns, but the courts might have to be called upon to decide the issue.

Under the supremacy clause in the Constitution, national security can preempt safety concerns in an emergency, but the courts are reluctant to recognize such preemption unless congress has clearly ordained it.[24] Safety concerns would probably cause delay during many larger-scale emergencies. One proposed solution is for planners to coordinate with state and local agencies on potential safety issues in peacetime.[25] Another suggestion is for DOD to prepare standby legislation to allow the President to exempt categories of activity from the safety and environmental laws.

As evidenced by the PEPCON case, planners should know the procedures for getting a waiver so that they can take action quickly when needed. These same conclusions hold true for environmental laws, as shown by the Avtex case. Avtex was a major offender of both air and water pollution laws. News articles quoting Environmental Protection Agency (EPA)

officials continued to cite Avtex as exceeding the Virginia air pollution standards.[26] Of the 2 categories of pollution, the water pollution issue is especially interesting because the basic legislation contains no provisions for waiver for national security. According to Richard Danzig, who in 1983 compiled a summary of laws both authorizing and limiting DOD's mobilization authorities, the Clean Water Act permits no exemption whatever if the pollutants are toxic, although the confrontation is usually resolved out of court, as in this case. According to the chief of the Enforcement Office of Virginia's State Water Control Board, the confrontation with Avtex over water pollution was settled when Avtex agreed to limit its discharge to permit specifications (an agreement it has since violated, so contributing to the permanent shut down in early 1990); and to spend a portion of the $5.775 million provided by the government to correct the water pollution problem.[27]

EPA is still in the process of guiding cleanup of a large groundwater problem stemming from the plant's operation over the past 50 years. The laws for allocating costs of large-scale cleanups (Superfund) allow EPA to assess liability for cleanup to "potentially responsible" parties. EPA uses this term to describe other principal customers, holding companies, and the like, who can be construed to be "owners and operators" responsible indirectly for past production. As a result, firms try to avoid getting placed in that category.

If the EPA determines that the federal government, through the War Production Board, specifically directed production by the plant during World War II, the government may be judged an owner-operator, and thus liable for a share of the costs. During a 29 November 1988 meeting of the Ammonium Perchlorate Interagency Group, EPA representatives implied that the Commerce Department, as the successor to the War Production Board, might be held liable. The government's further involvement with Avtex as a "responsible party" may carry with it an increased probability of a share of the cleanup cost. The Department of Justice, Department of Commerce, and Federal Emergency Management Agency are researching the legal succession of the War Production Board. Although any financial liability will be paid for by the US

Treasury, the legal proceedings allocating financial responsibility will consume valuable administrative time. To generalize from the Avtex case, a second lesson emerges:

> Environmental concerns were compromised in the interests of national security in the Avtex case; equally difficult choices are likely during any emergency expansion of defense production.

During emergency expansion of production, environmental problems at private and federal facilities will require the government to accept some toxic pollution in exchange for rapidly increased production for national security. This will be true in facilities like Avtex, where compliance with toxic emissions standards under normal production rates is, at best, borderline, but where continued or increased production by the plant is considered essential to national security.[28]

Management Roles and Decision-making At the National Level

Despite the extensive planning for managing the US response to national security issues, these 2 cases show some discrepancies between the roles and responsibilities as planned and practiced. The role of the NSC staff in coordinating the emergency management process at the national level is generally acknowledged[29] and, in the PEPCON and Avtex cases, the NSC staff did coordinate the responses, with participation from the Federal Emergency Management Agency (FEMA), DOD, the Departments of Commerce and Transportation, and other federal agencies.[30]

The NSC staff members directly led the response to the ammonium perchlorate incident through the Interagency Group meetings, where they reviewed progress and assigned responsibilities. The Interagency Group requested FEMA's decision on issues such as whether and how they might use the Defense Production Act to allocate ammonium perchlorate to critical programs in the commercial space launch industry.[31] In requesting FEMA's ruling on that issue, according

to NSC staff, the Interagency Group followed the current version of the National Security Resources Preparedness Executive Order 10480, dated 1978, : which states that FEMA has oversight responsibility for implementing emergency actions. FEMA's response seemed to draw heavily on DOD and NASA certifications and concurrences. (This issue is discussed more fully in the next section). FEMA's reliance on other agencies and its acquiescence in the NSC's leadership further clarify the de facto lines of authority in managing mobilization types of emergencies. Several redrafts of Executive Order 10480 have been circulated for comment. These drafts still call for FEMA oversight, approval, and coordination of cabinet-level agency responses. Even the word *coordination* carries some connotation of control, adjusting elements (in this case, cabinet-level interests) either up or down, to achieve balance among them all.

Although nearly all participants involved in the NSC-directed Interagency Group expressed satisfaction with the management of the emergencies discussed here, it is important to note that if either emergency had been larger in scale, the NSC would not have had the staff to coordinate and resolve all the potential interagency disputes.

Executive Order 12656, issued in November 1988, changes FEMA's role.[32] One section of this order directs FEMA to serve only as adviser and assistant to the NSC for emergency preparedness planning, but another section still calls for FEMA coordination and implementation of national security emergency preparedness programs and plans. It also calls for FEMA coordination of policies and programs for mobilization in response to national security emergencies. In comments on this paper while in draft, FEMA expressed the opinion that its role is clear and workable as currently outlined in directives like Executive Order 12656.

In contrast, National Security Decision Directive (NSDD) 188, issued in September 1988, provides for a flexible interagency process, guided by the NSC staff; such a process can be responsive to many situations. Membership will vary

with the task to be accomplished, as in the ammonium perchlorate incident. NSDD 188's statement that FEMA is not a policy-making agency on issues pertaining to national security appears to constrict FEMA's role in this type of emergency management.

Although the written, executive level directives appear somewhat contradictory concerning FEMA's role in national security, the distinction between NSC and FEMA management roles in practice in the two cases studied helps to clarify those roles. In interviews with several participants on the Interagency Group for this report, only the NSC staff representative argued that FEMA should have taken a greater leadership role during the process. Most group members expressed the view that NSC staff managed the interagency coordination process well, and some said it would have been inappropriate for FEMA to have tried to assert a stronger leadership role.

The participants seemed to endorse a general, continuing trend away from FEMA's central role in crisis management, pointing to an 2 August 1984, memorandum to NSC from Attorney General William French Smith commenting on a proposed revision to Executive Order 11490 which deals with continuity of government. In that memo, Smith expressed the opinion that it was improper for FEMA to act as an "emergency czar" and that FEMA should not insert itself between the President and cabinet-level agencies. The same comments are being made today on other executive-level directives, especially on the draft revisions of Executive Order 10480.

The management lesson learned from the handling of the two emergencies discussed here can be summarized as follows:

> The PEPCON and Avtex national security emergencies were effectively managed through a special interagency steering group.

In a future problem involving conflicting agency interests, the same type of forum, with NSC coordinating and overseeing the responses, would probably be used. Only guidance from the top executive level can have the necessary effect. The second lesson is directly related:

> FEMA's role in emergency management of national security issues is unclear.

In view of the way these two emergencies were handled, it appears that FEMA is unable or unwilling to assert strong management of mobilization response. To avoid confusion about what the federal directives state concerning FEMA's role and to implement what seems to have been, in these cases, a workable approach to managing and coordinating interagency responses to mobilization types of problems, it might be wise to redefine FEMA's role in a revised Executive Order 10480, as that of mobilization adviser to the NSC and other government agencies. Knowledgeable participants claim that this was the intent of the revision to Executive Order 12656. A good analogy for this role definition is that of the staff officer in a military unit, who provides advice to the commander and subordinate units, while actual authority and responsibility remain in the chain of command between the senior commander and the subordinate unit commanders. In this case, FEMA would be the staff officer serving the President/NSC and cabinet-level officers.

To implement such a recommendation would require additional review of whether large-scale mobilizations could be similarly coordinated via the interagency process, perhaps with full-time personnel detailed from the agencies, as in the ammonium perchlorate case. If so, the executive-level directives should be carefully worded to omit references to FEMA's guiding, directing, or coordinating implementation of national security actions. Because various executive orders appear to blur rather than clarify the roles of FEMA and NSC, Executive Order 10480 should be republished with this distinction clearly stated: FEMA should *advise and assist* the NSC

and other government agencies but not direct or coordinate any cabinet-level agencies.

Allocations of Critically Short Material Among Defense and Other Users

The government had first to determine its own requirements for ammonium perchlorate, then allocate the scarce resources among the government programs and the requirements of the commercial space launch industry and our allies. The Defense Production Act gives the government authority to direct industry to satisfy defense and space related contracts (if considered essential to national security) ahead of nondefense contracts.[33] This section describes how requirements were developed for government, commercial, and foreign allies' uses and how ammonium perchlorate was allocated among these categories.

Government requirements were the obvious first step. As noted, DOD and NASA assembled estimates of the requirements for ammonium perchlorate versus projected production capabilities in the first few days following the explosion on 4 May, but these were mostly high-end estimates. Minimum essential ammonium perchlorate requirements and statements of impact on national security and the requirements for numerous smaller programs, such as small rockets for ejection seats, were to take more time.

After nearly a month of staff work failed to complete the requirements picture, the NSC staff tried to encourage the agencies to work harder. On 3 June, the NSC staff sent a memo to DOD, NASA, the State Department, and the Department of Transportation asking for an estimate of requirements by 10 June. The memo further said, "NSC will arbitrate priorities, ...give volume, impact on national security, alliance relationships, and the budget." An important point here is that the NSC staff asked for requirements from the Departments of State

and Transportation and took steps to get them involved directly in the requirements effort.

NASA had undertaken a review of critical suppliers in the early 1980s when considering expansion of the shuttle program. With a threat to its only major system, NASA moved quickly to assess the ammonium perchlorate supply and to review other component suppliers to identify similar potential problems. NASA completed a preliminary assessment of components supplied by a single source and by limited sources in late summer, but apparently this assessment was not enough for NASA management. When Avtex closed down in November, NASA announced a new plant-by-plant study of the shuttle suppliers.[34]

DOD has many systems that use ammonium perchlorate, and it took more time to assess requirements in detail. Participants outside DOD considered its process slow. An Army staff officer acknowledged that it took nearly 2 weeks after the explosion to find out that ammonium perchlorate is a component in certain of its conventional munitions. DOD first obtained forecasts of needs from the program and budget projections; DOD then obtained impact statements through the program management channels and information on actual scheduling from production contractors. All this took several weeks.

OSD queried its automated industrial base information system, DINET (Defense Industrial Network), which yielded recent news articles on PEPCON and Kerr McGee and data showing that the Defense Logistics Agency had made small ammonium perchlorate buys directly from contractors. DINET had no information on DOD's requirements or on PEPCON's or Kerr McGee's output.

Because of the problems with limited-source components like ammonium perchlorate and aerospace-grade rayon, the NSC staff, on 29 November, directed NASA and DOD to begin an analysis of all single source vulnerabilities and to recommend policy options. Both DOD and NASA are continuing their work in this area, but their preliminary work will cover only NASA's shuttle and the Titan system. Because DOD is also responding to priority congressional direction to

analyze major weapon systems, it has limited resources to devote to this effort. The review of the 2 major systems will be used to respond to both directives.

DOD used budget and program quantities to get end-item requirements. It then went to prime-contractor and subcontractor producers to determine how much ammonium perchlorate would be necessary to satisfy the program schedule. The main DOD information systems supposed to help with this kind of analysis were of little or no help because they do not yet contain basic data on requirements or industrial capability. DOD is now assessing industrial base capability for major weapon systems and intends that this data will be maintained in the central information systems. In the 2 cases studied here, because the DOD had to revert to a fairly manual approach to getting requirements, additional time was required to decide on a plan of action. Three additional lessons on requirements and allocation emerge. First:

> At the national level, the government had to use a manual system for summarizing requirements and comparing them to industrial capability.

Actual allocation decisions will require further analysis of individual system production schedules, as was shown in the ammonium perchlorate case. It would be useful, however, to have a better starting point than budget program dollars, which require time to translate into requirements for materials and components.

Commercial requirements were hard to pin down. NSC asked the Department of Transportation to identify and rank commercial demands, but the resulting estimates included firm requirements along with all potential orders, because commercial users were still negotiating some of the orders. (These latter requirements were based on market forecasts and, in some cases, were optimistic.) In its formal June 1988 response to the NSC request, The Department of Transportation estimated that 3.8 million pounds of ammonium perchlorate would be needed for contracted commercial requirements during the next 12 months. This amounted to about 10 to 15 percent of the

projected output of Kerr McGee. The Department of Transportation had difficulty setting priorities among commercial users' requirements, commenting later that it is nearly impossible to rank the importance of commercial industries to the nation. For example, is Martin Marietta's commercial launch business more important than United Technology's? It is much easier to rank the importance of specific defense payloads being put into orbit by these commercial industries, as was in fact done.

Foreign requirements were developed by DOD, which is usually the primary decision point for foreign defense users, because DOD is the most knowledgeable about priorities among our allies. The State Department also has a role on these foreign-policy issues. Even Commerce had an interest lest the support to foreigners be broadened to include commercial users as well.[35] As already mentioned, during the PEPCON emergency the NSC staff asked the State Department to help develop the foreign requirements. DOD and NASA recognized the importance of foreign requirements for ammonium perchlorate from the beginning, but the initial allocations omitted them, at least partly in an attempt to get foreign users to consider qualifying other suppliers of ammonium perchlorate.[36]

Foreign defense users received the same message from the State Department during the export license process. Because ammonium perchlorate is a munition, exports require a license. Working with the Office of Munitions Control in the State Department, which manages that process, the Air Force developed special language for ammonium perchlorate license approvals. Foreign purchasers who obtained a license from the State Department were alerted to the possibility that they might not get the ammonium perchlorate even though their license was approved. The notice they received mentioned the shortage of ammonium perchlorate in the United States and said that the request for export, which must first be endorsed by their own government, would require at least 2 and possibly 3 further reviews by the Commerce Department and the Ammonium Perchlorate Interagency Group.[37] Responsible Air Force staff deny the intent, but this notice

appeared to send a clear message that foreign applicants for exports of ammonium perchlorate should look elsewhere.

Allocation was the next step. After requirements from DOD, commercial, and foreign users were pulled together, the job of making allocations among them began in earnest. The Ammonium Perchlorate Allocation Group was chaired by OSD, but the Air Force did the majority of the staff work. The Air Force staff established 2 lines of communication, an official channel to NASA and the armed service representatives and, eventually, to the Department of Transportation, and a second, informal, channel to the companies actually loading the rocket motors. Frequent telephone conversations with company personnel helped to give the Allocation Group a complete picture of the production planning and improved the perspective for the allocation decisions.

The Allocation Group began by challenging stated requirements. It also held sometimes lengthy discussions about each program's relative importance to national security that resulted in no actual allocation decisions but did help identify relative priorities. The group later used a different approach in actually allocating against the resulting priority list, relying on "need dates," defined as when ammonium perchlorate was needed to maintain all production and all launchings on schedule. Here, the group also considered factors that helped Kerr McGee produce efficiently, adjusting the allocation schedule slightly to accomodate different grade requirements of ammonium perchlorate and keep Kerr McGee's total production level high.

Although the group relied on DPAS (the Defense Priorities and Allocation System) in developing the allocation list, it granted all programs virtually the same priority. In fact, the space shuttle, a program with a "DO" priority,—one level below "DX," the highest priority—actually received ammonium perchlorate ahead of all DX programs because its motor loading schedule was tight and payloads were important in this allocation decision. National prestige was also important—the United States was recovering from the Challenger disaster. Even programs not originally rated under the DPAS, like commercial space launches, were considered.

When nonrated programs, such as commercial space and foreign defense, were judged critical to national security, the government eventually gave them a rating. The Army's Multiple Launch Rocket Systems MLRS was the first program to be cut, by 15 percent. The Allocation Group targeted MLRS because it was a large-volume user of ammonium perchlorate and because only MLRS could absorb a sizable cut or program "stretch out" without affecting a specific launch mission.[38]

Because some programs using ammonium perchlorate from PEPCON now had to requalify production lines with Kerr McGee's product, internal production schedules slipped. This slippage had the effect of reducing the requirement problem. For example, although the Titan production contractor was able to maintain its external government delivery schedule for production and therefore did not default, internally this company's program slipped a month's production of rocket motors while requalifying and so needed ammonium perchlorate for one fewer month in 1988.

By scrutinizing the production schedules and carefully allocating according to need dates, the Allocation Group was able to develop a plan to satisfy almost all requirements completely. As mentioned, inventories at the motor loading plants were taken into account and just enough of the product was planned for allocation to supplement these inventories. In early 1989, when these inventories and those at Kerr McGee were drawn down, additional program cuts had to be made in US defense programs, causing postponement of a Titan launch.[39] Initially, these plans covered only 1 month at a time because the group members could only agree on the highest priority shuttle. Getting monthly decisions to Kerr McGee allowed them to go ahead with production. The later allocation plans covered several months.

The Allocation Group brought its allocation plan to the NSC-chaired Interagency Group. After any necessary adjustments the Allocation Group then forwarded the plan to the Department of Commerce, which administers and has the power to enforce the Defense Priorities and Allocations System through issue of an official allocation directive to the

manufacturer. After a final check with the NSC staff, the Department of Commerce sent the directives to Kerr McGee. The check with the NSC staff sometimes turned out not to be perfunctory; more than once the NSC staff put a hold on the allocation plan while checking with the Department of Transportation and others.

The issue of allocations between commercial space and military programs was a political one, and a closer look provides insight into unique management and allocation issues. Commercial space launch companies received all the ammonium perchlorate needed for their launches. From the beginning, the Ammonium Perchlorate Allocation Group reserved the necessary ammonium perchlorate for the commercial launches in the allocation planning, even though no commercial launches were "rated" until August 1988. Until the commercial launch programs received a rating, it would have been a violation of the Defense Production Act for Kerr McGee to ship to these companies when rated defense orders had not been filled. The fact that the MLRS program, a purely defense program, was cut to satisfy a program less directly related to defense, commercial launch capability, reflects an interesting judgment that the latter was more important than the maintenance of full MLRS production.

How the ratings for the commercial requirements were made is especially interesting because this is an area with little precedent. Under Executive Order 10480, FEMA has a policy role in administering the Defense Production Act. In August 1988, FEMA was asked to approve the issuance of ratings for 2 commercial launches. The ratings were based on a determination that the second payload was required for national defense and that the company was contractually bound to the first launch. Failure to launch the first payload would hamper the company's ability to make the second launch. The Department of Transportation initially requested that the Commerce Department grant the 2 launches priority ratings. Because of uncertainty about the applicability of the national defense rationale to the first launch, Commerce requested FEMA approval of the ratings. FEMA approved the ratings after securing certification from NASA and DOD that the

2 launches were related to national defense. Thus, 5 different agencies were involved in the formal approval of the ratings.

In September, the Departments of Transportation and Commerce opened discussions with FEMA about the issue of rating other commercial launches. The first solution explored to resolve the problem was to request a Presidential determination under section 101(b) of the DPA, which says:

> The powers granted in this section shall not be used to control the general distribution of any material in civilian market unless the President finds: 1) That such material is a scarce and critical material essential to the national defense, and 2) That the requirements of the national defense for such material cannot otherwise be met without creating a significant dislocation of the normal distribution of such material in the civilian market to such a degree as to create appreciable hardship.

The Interagency Group finally concluded that a finding under section 101(b) was inappropriate because the paragraph quoted appeared to be directed at controlling ammonium perchlorate distribution in the civilian market at a time when there was no ammonium perchlorate in the civilian market—all available ammonium perchlorate had already been allocated to rated programs. By law, Kerr McGee could not make ammonium perchlorate available to an unrated contract until all the requirements of the rated contracts had been met.[40] Furthermore, the section could be construed as trying to make more ammonium perchlorate available for defense needs ("Requirements of the national defense for such material cannot otherwise be met") rather than diverting ammonium perchlorate from defense needs to civilian needs, as was the case here, until the commercial space launch industry was designated as a national defense program.

Action was then taken to certify that the commercial launch industry was eligible for priority ratings under section 101(a). On 9 September, the Department of Transportation requested FEMA to approve its determination that the commercial space launch industry was a national defense

program because it served as a reserve fleet for the military and because the technological leadership in space depended on a vibrant commercial industry. This determination was consistent with the President's National Space Policy, which directed NASA to cease competing with the commercial sector for satellite launches. Thus, the commercial sector was now responsible for some of the missions with which NASA had been charged at the time that the Defense Production Act was amended specifically to include "space" programs in the definition of national defense (section 701[d]).

Citing formal concurrence of both NASA and DOD, FEMA approved the designation of commercial space industry programs to be essential as a reserve fleet through its memorandums dated 20 September and 28 October. This designation was only for ammonium perchlorate. A broader designation of eligibility for priority assistance could have complicated future allocations for things other than ammonium perchlorate in the commercial marketplace.

Because officials in FEMA and the Departments of Commerce and Defense had difficulty interpreting paragraph 101(b) of the DPA, clarification seems appropriate to enable its proper use.[41] A second lesson on allocation is:

> Paragraph 101(b) of the Defense Production Act needs to be clarified in future guidance; clarifying it during the rewriting of Executive Order 10480 would be appropriate.

The Allocation Group also had to consider allocating ammonium perchlorate to allies' production programs. Officially, the Commerce Department is to manage priorities and allocations in support of international defense programs, with advice from the DOD. Requests for priority assistance are sent through the DOD to the Commerce Department.[42]

Requests for ammonium perchlorate from foreign defense users such as European MLRS were considered along with other US defense requirements. The Allocation Group limited the amount of ammonium perchlorate it allocated abroad to

that necessary to continue production schedules until the foreign users could qualify additional sources, but foreign users were given no specific cutoff date or quantity limitation. DOD hopes that PEPCON will begin production soon enough to satisfy these requirements with US production and thereby avoid giving foreign competition further marketing opportunities.

In an effort to avoid having to allocate very small amounts, the Allocation Group, on 10 October, authorized Kerr McGee to use any ammonium perchlorate left over from production to satisfy orders of up to 50,000 pounds for any US customer, so long as the product was not exported.

Avtex did not pose allocation problems. The portion of its output that is unique to defense and space is small, and the proportion of its production for aerospace-grade rayon has been increased; hence Avtex can satisfy all demands easily as long as it continues to operate. Because Avtex could fail again, DOD and NASA advised their program managers to double their production orders of the critical rayon fiber to allow some safety stock. The government plan is to qualify a second source, in order to eliminate dependence for supply of this rayon on a financially weak sole source beset by potentially large environmental problems.

Because Avtex is producing at a rate high enough to satisfy both government and private industry needs, commercial launch users should have no problems obtaining their supplies. At one point, DOD suggested that because government had paid for the financial rescue, commercial users might be excluded from the allocation of aerospace-grade rayon. (In response to a direct request from NASA and DOD to help make Avtex a viable enterprise again, private industry, concerned about assuming the environmental liability, refused to assist during the emergency by investing or even by placing orders for rayon.)

Allocation during an emergency will not necessarily follow the DPAS ratings. The commercial sector and foreign defense users asked for and got ammonium perchlorate

through the allocation process. An additional lesson learned in allocating between defense and nondefense is:

> Allocation during an emergency requires consideration of more than the initial Defense Priority and Allocation Systems priority ratings.

The Defense Production Act enables defense requirements to take absolute precedence over nondefense work, but the decisions in the PEPCON case proved to be far from simple. Other reasons were also considered. Although the basis for allocation to US commercial space launch users was their backup capability for defense satellite launches, the Department of Transportation argued in its memo to FEMA that keeping an important industry healthy and competitive with its foreign counterparts is an important national security consideration. This argument is appealing today in an era of increasing emphasis on US competitiveness. Representatives of the State Department and DOD argued that good relations with allies, even including support for their nondefense industries, are essential to national defense. Awareness of all these issues in this case helped planners see a bigger picture. In a larger-scale emergency the issues may well be similarly complex.

Preparing for Future Emergencies

This account of the handling of 2 emergencies suggests ways in which the planning process can be improved and how future emergencies can be planned for. The following conclusions can be drawn from the 2 crises that have been described:

> NASA and DOD lacked the authority necessary to approve either a direct or guaranteed loan to PEPCON; this lack of authority proved troublesome. However, financing defense production can be expedited on an exceptional basis under existing authorities, including The National

Defense Commerce Act, 50 U.S.C. 1431 (P.L. 85-804), as was done in the Avtex case.

National security considerations can legally preempt safety considerations, although it was not necessary to engage in such preemption in these cases. National security conflicts with environmental law were resolved without going to court. In both the PEPCON and Avtex cases, the government strongly supported resumption of production only when it complied with applicable laws.

The NSC staff interagency management review process worked well to oversee the decision-making process and will probably be used in any similar situations in the future. All participants readily accepted NSC staff leadership. FEMA's role in national security needs to be more clearly defined as advisory rather than managerial.

Government information on requirements and capabilities of the industrial base is inadequate. The Defense Production Act authority, section 101(b), requires clarification as it relates to control of material in the commercial marketplace.

Allocation of a scarce, essential resource during an emergency calls for consideration of much more than the initial Defense Priority and Allocation Systems priority ratings. The requirements of our allies and of US commercial users must be considered along with the priority of US weapon systems.

Other reports have suggested some of these lessons, but the documentation here of what actually happened in Henderson and Front Royal, reaffirms the basic need for improved prediction rather than reactive problem solving. The NSC staff has initiated an analysis of the industrial base to identify other single or limited-source producers, but it will take continued efforts on the part of government planners at all levels to maintain a proper vigil over those producers and to act from a calm, long-range perspective, even when facing a crisis. Perhaps this study can help inform planners, thereby preparing them in advance for any future crisis.

Notes

1. The National Security Decision Directive 188, September 1985, directs the use of interagency meetings as a means to resolve issues of an interdepartmental level.

2. Statement of James Arrendale, president of the Green Valley Community Association, to the second congressional hearing held in Henderson, Nevada, to review recovery status after PEPCON explosion. For the complete text, see official *Congressional Hearings on the Explosion at PEPCON: Local Impact and Recovery Activities,* subcommittee on Investigations and Oversight of the Committee on Science, Space and Technology, House of Representatives, 100 Cong. 2d Sess. June 8, 24, 1988. Referring to the split between people who did not work in the ammonium perchlorate plants and those who did, Arrendale said, "Our community is severely divided, . . . one camp demanding the plants be closed forever, the other [camp] insisting the explosion was only a convenient excuse to close the plants."

3. Statement by Grant C. Peterson, associate director, State and Local Programs, FEMA, to the second congressional hearing on the explosion. For complete text, see official record: *Congressional Hearings on the Explosion at PEPCON: Local Impact and Recovery Activities,* June 8, 24, 1988. Peterson said that FEMA was asked to take a "fresh look," and the second review began.

4. Conversation with NASA's George Abbey, who said that Japanese manufacturers had come to the United States for ammonium perchlorate because their own domestic sources could not produce ammonium perchlorate of acceptable quality.

5. The briefing presented to OSD on June 3, showed that numerous programs had some dependence on ammonium perchlorate (AP). The following information was presented at that time:

PROGRAMS USING AMMONIUM PERCHLORATE

Navy	*Army*	*Air Force*
Trident D5	ATACMS	Peacekeeper
Tomahawk Cruise Missile	MLRS	Minuteman
Quickstrike Mine	FOTL	Maverick
Sub-Launched Mobile Mine	Hawk	Titan 34D
MK 46 Torpedo	Patriot	Titan IV
MK 57 Bomblet	Stinger	Delta II
MK 48 ADCAP Torpedo	Chapparral	— Castor 4A
MK 6/JATO	155MM HE	— GEM
MK 23		AMRAAM
MK 66	*NASA*	HAVENAP
Standard Missile Motors (6)	Shuttle SRM	Inertial Upper Stage
AEPS (Ejection Seat)		Star 37
Rolling Airframe Missile		Star 48
Smokey SAM		Sensored Fused Weapon
Sparrow		SRAM II

Harpoon	Hypervelocity Missile
Sidewinder	ACES II Ejection Seat
Phoenix	Small ICBM
HARM	AGM-130

6. The Army manages 26 ammunition plants, most of them in the eastern half of the United States. The land, buildings, and production equipment are owned by the government but operated by private contractors. The Army became the owner of these plants during World War II when it was trying to expedite production. As DOD's manager for conventional ammunition, the Army now invests approximately $500 million annually in building new production facilities and in modernizing and repairing older ones.

7. Indemnifying, as used here, refers to a government commitment to buy the production equipment at the unamortized value if the contractor cannot sell at least a specified amount to all customers.

8. For additional information see: *Explosion at the Pacific Engineering Ammonium Perchlorate Plant: Local Impact and Recovery Activities,* 8, 24 June 1988, p. 33.

9. In an analysis paper presented to NSC interagency meeting on 21 June 1988, OSD estimated that only Japan had a large enough capacity, 12 million pounds per year, to be of interest. See also "Brazilian Missiles, Have Perchlorate, Will Launch," *Economist,* 5 September 1987, p. 86. According to the article, the Soviet Union, France, and Japan all have plants producing some AP. Brazil was coming on line, but only with a small facility.

10. Ironically, the safety review of Kerr McGee operations recommended reducing inventories to reduce the chance of larger explosions. From an allocation standpoint, it was fortunate that the recommendation had not been implemented earlier; the additional ammonium perchlorate came in handy.

11. "Avtex Gets $20 Million Bailout," *Washington Post,* 19 November 1988.

12. Telephone conversation with George Abbey, NASA Headquarters. The eventual cost will probably exceed the anticipated $60 million. In PEPCON's hurry to expedite the construction contract, some design details were not specific enough.

13. The Defense Science Board's 1988 Summer Study, *The Defense Industrial and Technological Base,* December 1988, section V, p. 117. According to the study, "Access to the capital markets is now available only to the largest companies and largely restricted to debt securities. Second-tier companies have little, if any, access." There are two reasons cited for this situation: projected defense budget cuts and tougher rules by DOD on allowable profits.

14. Shortly after the explosion, in an effort to insulate itself from this liability, PEPCON spun off a new corporate entity, PEPCON Production Incorporated (PPI). To avoid confusion I have simply used the name PEPCON.

15. Office of Management and Budget Circular A-70, *"Policies and Guidelines for Federal Credit Programs"* (revised) 24 August 1984.

No firm evidence exists on what OMB would have done with a request for loan approval, because NASA and DOD never requested approval, but OMB staff have outlined policy as follows: Loans and guaranteed loans are not generally appropriate in situations like that involving PEPCON, in which the main market for the output is government programs. OMB tends to support loans in situations where the end use of the product is completely in the private sector, like small business. OMB staff members also suggested that in cases when the government buys virtually all the output, it would be more appropriate, from a cost standpoint, to pay directly for facilities rather than to incur the costs of using private financing. But OMB's own policy advocating private ownership of commercial and industrial facilities would conflict with this recommendation. If DOD directly financed the construction without some sort of repayment structure, it would necessarily take title to the facilities.

16. Title III, the Defense Production Act (DPA) of 1950, with amendments through 3 October 1986. P.L. 99-441. The DPA authorizes loans and guaranteed loans, but Section 4, "Limitations on the award of Financial Assistance," similar to the OMB circular, requires budget approval of these loans and guarantees to encourage expansion of essential defense production and is thus of limited use in this type of emergency. Loans under Title III authority are also not used in the course of normal business. According to a conversation with Mike Corridore, of OIBA, DOD submits no requests for loans because OSD believes that administration policy strongly discourages this action. OSD simply requests, during the annual appropriations process, authority to guarantee purchase commitments. OMB requires the guarantor to have funds reserved to cover 100 percent of the authority. Recently, the annual Title III program has ranged from $10 million up to $33.5 million in fiscal year 1989. DOD submitted a request for $10.7 million budget authority to Congress for fiscal year 1990. In 90 percent of the cases, these funds are not actually spent because contractors sell enough to honor the purchase commitments; as a result, most funds are tied up but never actually used. The projects are chosen to benefit all the services by providing necessary production of raw material or component production. Interestingly, one of the main objectives of the DPA, when it was enacted during the Korean War, was to expand basic industries, including the steel, chemical, and electric power industries, through production and *loan* guarantees. (See Rod Vawter, *Industrial Mobilization: The Relevant History* Washington, DC: NDU Press, 1983.) Expansion of these industries was supposed to benefit the military equipment production and to expand the economy so that defense expenditures would grow concurrently.

17. Conversation with Anthony Wu of OMB on 30 January 1989. He suggested in retrospect that, because PEPCON was in such a weak financial position, the government should have vigorously pursued alternative sources of ammonium perchlorate, instead of offering the incentives. He argued that financing would probably not have been a problem with a different, financially healthy supplier. But he agreed that although pursuing the private financing took nine months, the NASA/DOD decision in June 1988 to go with PEPCOM did allow design and layout of the new facility to begin almost immediately. DOD and NASA reasoned that pursuing an alternative source would have delayed this start at least several months.

18. Richard Danzig, *A Review of the Adequacy of Principal Statutory Authorities Affecting DOD Surge and Mobilization,* p. 38, a report for OSD, 1983. Several sources amplify and confirm the primary citation. Use of P.L. 85-804 is also covered detail in *The Extraordinary Contractual Relief Reporter, Washington, DC:*—published annually by Federal Publications. Apparently, Congress endorses its use, according to a conversation with James Dever, USAF General Counsel, who reviewed the Air Force position and prepared a lengthy position paper on P.L. 85-804 and PEPCON, because congress has continued to except reauthorizations. Other research shows references to its use for amending contracts to cover unforeseeable circumstances. It has historically been used to modify contracts with prime contractors, the Lockheed rescue being the most famous.

In the Avtex case, the Air Force had no existing contract to modify, and it wanted to avoid the overhead that might be involved by passing the action through several contacting tiers. The Air Force made a contract with Avtex for a slightly different use, but still in line with the intent and authority of P.L. 85-804.

19. Section II of USAF Memorandum of Decision #262, dated December 13, 1988, Subject: Extraordinary Contractual Relief Under Public Law 85-804 for Avtex Fibers, Front Royal, Inc.

20. P.L. 91-596, *Occupational Safety and Health Act of 1970,* section 16, provides for "variations, tolerances, and exemptions... to avoid serious impairment of national security." The act further outlines the procedures for obtaining such variation by filing an application with OSHA. For an interpretation, see also, Danzig, *A Review of the Adequacy of Principal Statutory Authorities,* p. 60.

21. "PEPCON will Build a New $23 Million Ammonium Perchlorate Plant," *Chemical Engineering,* 15 August 1988, p. 25.

22. Conversation with Mr. Robert Chestnut, Department of Justice attorney responsible for the ammonium perchlorate issue.

23. Conversation with Dr. Jerry Ward, of the DOD Munitions Explosive Safety Board, who is participating in the review. It appears that, based on particle size, ammonium perchlorate (AP) will still be classified as an oxidizer, not an explosive material.

24. Danzig, *A Review of the Adequacy of Principal Statutory Authorities,* p. 43.

25. William E. Durrwachter, *Safety and Environmental Regulation in Industrial Mobilization,* (Washington, DC: NDU Press, 1985), p. 43.

26. "National Survey Puts Virginia Fourth in Quantity of Toxic Air Pollution—Avtex Rayon Plant in Front Royal Cited as the Chief Contributor," *Washington Post,* 28 March 1989. The coordinator of Virginia's air pollution control program, Charles Holmes, said the state believes Avtex is releasing 12 times the safe level of carbon disulfide into the air. See also "EPA issues 'Road Map' of Chemical Emissions," *Washington Post,* 19 June 1989, in which Avtex Fibers, Inc., was cited by EPA as the firm with the second-highest level of air pollution emission in the United States.

27. Conversation with the chief, Enforcement Office, Virginia State Water Control Board. Both before and after the shutdown, Avtex promised to comply but then violated the guidelines. Thus, the company risks a new confrontation. In general, according to this Virginia official, who likened Avtex to other defense manufacturers in Virginia, federal facilities are much worse at complying than are private facilities, partly, at least, because of the age of their production processes. Statewide noncompliance for federal facilities is approximately 75 percent, whereas private commercial facilities average about 10 percent.

28. If federal facilities in Virginia are representative, this could mean most of the government-owned plants in the country are in worse shape than counterpart private facilities. Maintaining or increasing production by even a limited amount will bring this sensitive issue to the front pages of newspapers again. The proportion of federal noncompliant facilities is further evidenced by recent crackdowns on Department of Energy nuclear weapons plants but DOD is also getting attention. See "U.S. Would Add 52 to Waste Site List—E.P.A. is Proposing Federal Installations Be Classified as Hazardous Areas," *New York Times,* 14 July 1989, page A10, in which 52 additional installations operated by DOE and DOD may be added to the list of the nation's most hazardous sites.

29. This statement is based on interviews with participants and descriptions in books like Bradley H. Patterson, Jr., *The Ring of Power* (New York, NY: Basic Books, 1988), in which the NSC is described as process manager, crisis manager, and monitor of policy execution.

30. This management approach might not have been necessary if only one program had been involved, because the money required to reestablish ammonium perchlorate production would probably have been handled within the program. Certainly the allocation problem would not have existed. In this case, no one program could or should finance the entire investment, and someone above the program or the agency level had to oversee the allocation process.

31. Executive Order 10480, *Further Providing for the Administration of the Defense Mobilization Program,* 1978, Part 1, directs FEMA to coordinate all functions falling under the Defense Production Act. All agencies are to perform these functions subject to the direction and control of

FEMA. This order is under revision; FEMA's direction and control responsibility will probably be reduced.

32. Assignment of Emergency Preparedness Responsibilities, dated 23 November 1988. Issued during the period studied, this Executive Order, according to NSC staff, is intended to cover only the planning for emergencies, not the execution.

33. The Defense Priorities and Allocations System (DPAS), 15 CFR 350, is the government's system for implementing DPA Title 1 which deals with production allocation. Under this system, DOD and NASA annotate certain contracts to be satisfied before nonrated contracts. Therefore contracts for DOD, for example, take precedence over nonrated commercial contracts.

34. "NASA Seeking to Avert Shortages of Shuttle Parts," *New York Times*, 6 November 1988. Richard Truly, the shuttle program's chief, ordered the study to identify other critical parts for which only one source exists. Apparently, Avtex was not on the list of critical suppliers, compiled previously.

35. According to the Department of Commerce, "foreign users" meant only defense users; foreign commercial users were not to be considered.

36. Conversation with Major George Williams, USAF, and review of OSD's memorandums allocating ammonium perchlorate (AP), sent to the Commerce Department beginning in June 1988.

37. The exact wording of the notice is as follows:

> United States Department of State
> Washington, D.C. 20520
> Dated as appropriate
>
> *NOTICE REGARDING AMMONIUM PERCHLORATE*
>
> Because of the current shortage of ammonium perchlorate (AP) in the United States, domestic distribution and export of this material is now subject to allocation under the authority of the Defense Production Act of 1950 and Defense Priorities and Allocations Systems (DPAS) regulation (15 CFR 350). Accordingly, in order to export AP now that you have an approved Department of State export license, the following steps are necessary: (1) the program or weapon system requiring the AP must be deemed by the U.S. Government to "promote the national defense of the United States," (2) a priority rating on the purchase order for the material must be authorized by the U.S. Department of Commerce, and (3) an allocation of the material to meet the export requirement must be approved by a U.S. Government Interagency AP Group.
>
> To request a priority rating, you should complete Department of Commerce Form ITA-999 (Request for Special Priorities Assistance) and

submit it to the U.S. Department of Defense for sponsorship and forwarding to the Department of Commerce. This request must also be sponsored by the government of the foreign country involved prior to its submission. If the Department of Commerce authorizes the priority rating, the Interagency AP Group will review the export requirement along with all other AP requirements and make recommendations to the Department of Commerce regarding allocation of the available supplies of AP. The Department of Commerce will then direct the distribution of AP to ensure that the most critical requirement are met. This procedure will continue until such time as the U.S. regains full AP production capacity.

For further information, please contact Richard Meyers, DPAS Program Manager, U.S. Department of Commerce, telephone (202) 377-3634.

38. The only logical way to get enough ammonium perchlorate to make a difference was to cut the allocation to a big user. The alternative would have been to cut many small systems and cause so many program disruptions as to be unmanageable. Among the big users, only MLRS had a heavy enough production schedule to absorb a substantial cutback. Other major users had a small number of launch missions, and any cut would have caused the cancellation of one or more specific launches. A 50 percent cut for MLRS was considered at one point, but MLRS production managers found a way to use some unblended ammonium perchlorate along with blended so that a higher percentage of the production requirements could be filled.

39. The amount of inventory in process was about 20 million pounds, but Kerr McGee required 10 million for efficient production. The net gain was 10 million pounds, about three months' production.

40. According to a conversation with Richard Myers, at the Commerce Department on 28 September 1989, the legal basis for allocating to US defense contracts ahead of others often runs into conflict with other priorities. He gave me another pertinent example. Hercules maufactures solid rocket motors—which have large amounts of ammonium perchlorate—to several Navy and Air Force programs. When one of Hercules' three industrial mixers was destroyed in an explosion at its plant in March 1989, and the US considered prioritizing Hercules ahead of a French firm already in line for a new machine from a US manufacturer, the French government strongly objected. There arose the question of whether the manufacturer would be liable for default in a French court which may choose not to recognize US Defense Production Act authority. Although the US had the legal authority to order priority delivery to defense contracts, good relations with a foreign government were also judged important. In the end, Hercules engineers said the mixing machine being built for France was incompatible with their production process and could not be acceptably modified. An additional machine is being fabricated for them. Remaining production capability is being allocated between Air Force and Navy programs until the mixing machine comes on line.

41. FEMA staff representatives stated that paragraph 101(b) of the DPA was well understood, and they offered to provide a paragraph clarifying that use that I could incorporate in this paper. However, I still have not received that clarification.

42. Defense Priorities and Allocations System (DPAS) Handbook, Department of Commerce, 19 May 1987, para. 350.55c, subpara. H.

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