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RESOURCE PREPAREDNESS SEMINAR ONE

Volume I: Transcript

James S. Thomason, *Seminar Coordinator*

May 1994

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PREFACE

This two-volume draft paper is a transcript of the first seminar in a planned series of six held in 1992 and 1993 on Resource Preparedness. The statements and comments do not necessarily represents the views and opinions of the Institute for Defense Analyses, the organization represented by any speaker, or any department or agency of the United States government.

Volume I consists of a summary of the seminar followed by a transcript of the proceedings. Volume II contains the appendices, including the figures and viewgraphs accompanying each presentation as well as the agenda and list of participants.

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SUMMARY

This seminar examined the role of industry in supporting the Desert Shield/Desert Storm Operation, and identified some of the lessons learned from that experience. This first in a series of six Resource Preparedness Seminars was co-sponsored by the Federal Emergency Management Agency, the Department of Defense, and the Institute for Defense Analyses. It set the stage for the remainder of the seminars, which consider what preparedness plans, policies or programs are appropriate to address industrial preparedness issues in the future global environment. Speaking on behalf of FEMA, Mr. Joe Moreland said that he expected these seminars to help frame the issues that will need to be addressed as civil resource agencies grapple with the rapidly changing security environment. Mr. Joe Muckerman of DoD noted that history has shown the costs of neglecting preparedness, and that the present challenge is to ensure this does not happen again.

Presentations on the industrial support aspects of Desert Storm were provided by executives of six firms involved in supporting the fighting forces in the Persian Gulf. These firms represent a range of personnel-support items produced in large quantity for the Gulf War and two hardware items that proved critical in the conflict (see table).

Speaking for all the co-sponsors, Dr. Jim Thomason of IDA asked each presenter to comment on three specific issues, and to provide any additional insights as appropriate. The three questions asked of them were:

- What items did you accelerate for Desert Storm, how did you accomplish this, and in what time frame?
- In what ways did the government help accelerate production?
- What degree of acceleration would be possible several years from now; and what would you recommend the government be prepared to do to assist you?

INDUSTRY PRESENTATIONS

Presenter	Firm	Product
Mr. Horace Auberry	Wellco	Combat Boots
Mr. Glen Ailshie	SoPakCo	Meals--Ready to Eat
Mr. John Novak	Raytheon	Patriot Air Defense Missile
Mr. Lane Bonner	Siebe North Co.	Chemical Protective Gloves
Mr. James Miller	Survival Technology	Nerve Gas Antidotes
Mr. Jon Campbell	Grumman Melbourne Systems	JSTARS

A synopsis of each firm's experience provides insight into each firm's situation prior to Desert Storm, and that firm's response. (*The details of each presentation follow this summary.*)

- Wellco: Throughout most of 1990, Wellco had been producing combat boots at a sustaining rate of 1200 pair/day. In November, Wellco was requested to accelerate production of its tropical boot and introduce a newly designed desert boot. Wellco began deliveries of the new desert boot in December, and reached production of 3000 pair/day in February. Accelerated deliveries were authorized under a letter contract.
- SoPakCo: SoPakCo had been producing at a sustaining rate of 1.4 million cases of meals ready to eat (MREs) annually. SoPakCo was asked to accelerate in early November. An IPP planned producer, SoPakCo's plan provided for a seven-fold increase. They did not reach this planned maximum limit due to limitations in food stuffs provided by the government. SoPakCo refused a letter contract, and negotiated a fixed price contract for the accelerated deliveries.
- Raytheon: Raytheon was at full rate production of the Patriot missile in 1990. They were asked in August to accelerate deliveries of the ATM-capable version (PAC-2) of Patriot. First deliveries were available in August, five months earlier than planned. Over 600 PAC-2 missiles were delivered by January 1991. Deliveries were accelerated under the existing production contract.
- Siebe North: Siebe North was producing chemical protective gloves at a sustaining rate of about 700,000 pairs/year. They were not asked to accelerate production during the Desert Storm operation, but were asked to accelerate production in April 1991.

- Survival Technology: Survival Technology was asked in August to accelerate production, and went to three shifts a day, seven days a week, within two weeks. Production went from 250,000 units per year in August to seven million units per year in February. Accelerated production was authorized under letter contract.
- Grumman: The JSTARS aircraft was in the full-scale development phase in 1990. Grumman was asked in December 1991 to deploy two test platform aircraft to the Persian Gulf. They were able to do this within 30 days. Aircraft deployed with crew in time for commencement of air operations. This action initially was authorized by letter contract (20 December 1990) and later definitized by a new cost plus fixed fee contract on 25 April 1991.

Each of the industry presenters agreed that given the short time frame of Desert Shield and Desert Storm, a meaningful industrial response could only have been obtained from manufacturers with a warm production base. Several of the contractors (boots, MREs, gloves, nerve gas antidotes) were being maintained by DLA at a minimum sustaining rate at the outset of Desert Shield, and they believed this was an essential precondition for rapidly increasing their production. The Patriot Missile was still in full-rate production at the time, and had an established base of suppliers and employees. The only JSTARS assets that could be deployed were the two planes that were already available for development, test, and evaluation.

While the firms generally stated that the government was responsive, helpful, and effective in expediting accelerated production, some production delays did occur. They recommended a number of specific improvements; one related to letter contracts. Letter contracts are the government's primary vehicle for expediting deliveries in a crisis. They establish a maximum unit price and a tentative price, but postpone negotiation of the final contract price and profit. One contractor has yet to be paid under the letter contract he signed. Another flatly refused to enter a letter contract, based on earlier bad experiences, but accelerated production under his existing contract as a new contract was being negotiated. Other contractors said they did not object to letter contracts. One executive suggested that if a surge clause were negotiated in the standard annual contract, this clause could be exercised in lieu of initiating a letter contract.

Second, some of the firms believed the multiple layers of bureaucracy above the contracting officer slowed down the decision-making process. Third, contractors also generally felt the DX rating process was not sufficiently responsive to be helpful in the time frame of this conflict. For example, Raytheon applied for a DX rating for Patriot, but in the end they resolved their problems directly with their suppliers. A fourth

recommendation urged the government to explore practical ways to expedite delivery of Government Furnished Material so as to avoid the limits experienced by SoPakCo and others during Desert Shield/Storm.

In looking to the future, the executives all agreed that a government review of their recommendations in these four areas would be very useful. At a more fundamental level, they emphasized that a warm production base is essential even for preserving the industrial responsiveness shown in this recent conflict. A warm base is needed to retain suppliers and supplier relationships, a core of skilled workers, and to ensure that production equipment is in place and well maintained. In many cases, restarts could require wholly new government permits and environmental certifications, which would be difficult to obtain once they were allowed to lapse. Even for the most basic items, this restart process could easily take far longer than the six month buildup for Desert Storm.

In sum, key areas recommended for further consideration in future seminars include the following:

- Are letter contracts the best vehicle for accelerating production? If not, what alternatives may be more efficient?
- Are there too many steps in the acceleration process? Could some steps be combined? Is the communication between action points most efficient?
- If the government takes action to accelerate its prime contractors, should it also act to accelerate subcontractors? How? Can the government identify subcontractors? How many sub-tiers should be covered?
- Can the government improve the provisions of GFM as part of accelerating a system contractor?
- Does the government understand the difference in time involved in accelerating a warm line, restarting a cold line, and rebuilding a lost line? Do these time differences play a role in emergency planning and subsequent budget preparation?

Overall, the industry speakers expressed appreciation for the opportunity to present their experiences and recommendations. The plan for the second seminar in this series is to provide coordinated government feedback to these industrialists concerning their recommendations, followed by a collective effort to work out an implementation strategy for suggestions determined to be feasible and useful.

THE PROCEEDINGS

Dr. Thomason: My name is Jim Thomason and on behalf of the Institute for Defense Analyses I'd like to welcome all of you to the first in a series of Resource Preparedness Seminars; they are being held at IDA and co-sponsored by the Institute, the Federal Emergency Management Agency and, from the Department of Defense, the Office of the Deputy Under Secretary of Defense for Security Policy, Emergency Planning Directorate. Welcome to representatives from industry, from the Departments of Commerce, Labor, the Treasury, Interior, State, Defense, Energy, Transportation, HHS, FEMA, the CIA and IDA. I am very pleased that all of you could come. About two months ago, Mike Austin from FEMA advertised these workshops as a series of Sex Seminars. It's true that we at IDA can sometimes play by looser rules than the Federal government! It's also true that I did want to ensure a good turn-out today. But I must now tell you that Mike meant to say Six, not Sex. We'll be watching to see who will be leaving early, now that you know. But before you go we do have various hand-outs and there is a sign-up sheet in the back of the room for a demo on a pretty sexy model of the industrial base. It's called the Vendor-Level Module [VLM] of the Joint Industrial Mobilization Planning Process [JIMPP]. Dr. Dave Graham from IDA is the point of contact and LTC Finnicum is the point of contact from the Joint Staff. It can generate some very nice curves and we'll have more to say on that hot number later on.

An overview of these six planned workshops has been sent to most of you and is available as a hand-out. If any of you have any suggestions concerning any of the topics or seminars, please jot them down and put them into the suggestion box that we have available.

Today's seminar begins the series with an effort to bring some of the industrial heroes of Desert Shield/Desert Storm to one place and have them speak about several important issues concerning future U.S. military resource preparedness. The firms represented here this morning all played very active and critical roles in supporting the fighting forces in the Persian Gulf. We have senior officers from six American manufacturing firms here with us today. Actually five as of this moment and the 6th will arrive shortly. We have Mr. Glen Ailshie and Mr. Bill McCleary, President and Director of Government Contracts respectively for the Southern Packaging Company. We have Mr. John Novak and Mr. Leans of the Raytheon Corporation, Mr. Lane Bonner, Director of Government Sales of the Siebe North Corporation, Mr. James Miller, President of Survival

Technology Company, and Mr. Jon Campbell, Program Manager for Desert Storm at Grumman Melbourne Systems. Please join me in giving these gentlemen, who also represent the men and women who work with them to produce critical support items for the Desert Shield/Desert Storm operation, a very warm welcome. I know that Mr. Moreland from FEMA and Mr. Muckerman from DoD would like to extend a welcome to all of you as well. Joe Moreland, the FEMA sponsor of this initiative, has made this whole effort possible through his vigorous support. It's been very pleasant working with him and his associates Mike Austin and Doug Scott. Joe, would you like to say a few words?

Mr. Moreland: Well, truly just a few words. To reiterate what Jim says, welcome to all of you and a very hearty heartfelt thanks to all of you from industry who came in. The object of this would be without purpose if you hadn't offered your time and attendance. We're certainly looking forward to hearing what you have to say. One realization that we in the bureaucracy have is that we really don't have all the answers and we're coming to realize that we might not even quite know how to ask the right questions. We're really hoping that this event will give us a chance for you to be fully forthcoming within the bounds of your own propriety to tell us what your experiences were and in particular to focus on those experiences which you felt were particularly frustrating and which in addition you felt maybe the government could have done something better or different that would have helped. None of us is clairvoyant enough at this point to quite understand all that we should about the industrial base in this rapidly breaking picture of defense procurement. And we look at it from a different perspective, where we at FEMA have a primary mission in the civil sector of supporting the military requirements in coordination with the other departments and agencies. We're also interested in the different types of mobilization, if we can use that term, that clearly will be required to respond to domestic catastrophic emergencies — driven by particular natural or technological disasters. This is an area which is becoming increasingly visible to senior policy planners. It is also an area in which it is increasingly being realized that events may jeopardize national security. So that when we in FEMA and our civil resource agency colleagues are talking about national security and the interests of a viable industrial base, the preservation of that base, the competitiveness of that base, or the re-establishment of that base in a crisis, that crisis can be driven either by intentional conflict or natural catastrophic events. We're looking at it from the broadest panoply. The bottom line is that regardless of what the cause and the effect might be, the need to surge and produce, to preserve our "quality of life," if you will, is critical. With the greater insight we gain through this process today

and through the following five seminars, we hope to be better prepared to sustain this effort. Again, thanks very much and we're certainly looking forward to your comments. I think our good friend and colleague, Mr. Muckerman, will welcome you now.

Mr. Muckerman: I wish as co-sponsor of this fine gathering I could take equal credit but in all honesty I can't. This is really a FEMA initiative which we're proud to be part of. Over the years, FEMA in its coordinating role has held many meetings like this, whether global wargame exercises, or the real thing, or whatever. Their principal responsibility is bringing 27 departments and agencies together for a common purpose — getting more resources for contingencies. But this particular conference has an added dimension and that is industry, which is the core of our nation's strength. Welcome industry. The great philosopher Yogi Berra once said "When you hit a fork in the road, take it." Directly ahead is that fork, but there's no sign post. The Berlin Wall has come down, the flag of the Soviet Union has come down. As a consequence, our defense budgets are coming down. We're beginning a much smaller force which we hope will be adequate. Secretary Cheney has said that this time we're going to build down smart. No more Bataans, no more Kaserine Passes, no more Task Force Smith's, no more early defeats and heavy casualties because we haven't planned and prepared properly. But in order to build down smart you have to know how long it takes to build back up. And that requires that you not only know how long it takes to get something, but what additional measures you could take now or later to get more, as a result of changes in policy, work-arounds, additional sources, substitutes, etc. And that's what these conferences are all about. Another great philosopher and scholar, Sir Winston Churchill, described mobilization as follows: "The first year you get nothing, the second year you get a trickle, and the third year you get more than you can pay for." But that only applies to those nations that do not have a plan and do not routinely monitor their ability to increase resource production. That's what we're about. We're going to have a much smaller mobilized force. When we look at future budgets we will need to ask, how much mobilized force do we have to have and how much reliance can we place on our potential power — which is ever changing, and many people claim, diminishing. But if you know how long it takes to get MREs, Patriot missiles, and what you could do to get more of them if you had to, then you're going to be in much better shape. Thanks for coming.

Dr. Thomason: Thank you very much, Joe. That's a very strong motivation for this series of seminars. Before we begin with the agenda for today's seminar, with the speakers from industry, Fred Breaux will provide a few administrative notes.

Mr. Breaux: Good morning. On your parking validation, for those of you who drove a car, get a stamp like this from the security guard in the foyer. That will get you out without having to pay a fee. I remind you that we are in an unclassified session here at this seminar but we are in a classified area and that's the reason that we ask that you ask one of us to escort you if you need to leave the immediate vicinity of the Board Room here. For those of you expecting phone messages, they're coming in right outside the door. So if you need to check on one, ask one of the secretaries out there who also have Faxes available. If you're expecting one to come in, you might alert them; otherwise they will get it off of the machine and bring it in to you. Restrooms, in case you haven't found them, are right outside that wall down toward the outside wall. We also have a Suggestion Box over here. We're going to be rushed today and you probably won't have a chance to ask all of the questions you'd like to — to tell us the dialogue you'd like to have — or if you see something different from what they just told you at the speaker's podium, please, we have some forms around here, jot down your ideas your name and address and we'll continue the dialogue later. We do intend to close loops on this as much as possible. When you talk from the floor we'd appreciate it if you'd identify yourself when you first start talking. We have a couple of microphones here that are supposed to be sensitive enough to record all of our proceedings and we'd like to know who's got what comments from the floor when we hear them. Those of you who are going to be attending the other seminars, and I hope that's all of you, if you don't have a clearance with IDA, it would be a good idea. So you can see one of us who is associated with IDA today and we'll see what is necessary to get your clearance on file here and then we won't have to go through the visitor's routine as much as we did this morning. Thank you.

Dr. Thomason: Just a quick comment on the hand-outs before we begin: one, as I mentioned, on the JIMPP industrialization planning process, one on the Integrated Civilian Industrial Mobilization Planning Process [ICIMPP]. Doug Scott from FEMA is the point of contact for the ICIMPP hand–out. One on some very preliminary "macro," that is, industry-level, assessments of the capability of the U.S. to replenish, or to recover — under several different time frames — from drawn-downs or uses in a scenario similar

to but slightly more extended than the Desert Storm operation. That has been put together in a joint effort by IDA and FEMA. Doug Scott and I will be happy to deal with questions about those assessments later on.

Now the agenda for today's seminar. We've asked our six speakers from American industry to comment explicitly this morning on three things: (1) Their roles in accelerating production in Desert Shield/Desert Storm; (2) in what ways if any the government helped them, worked with them, to make this accelerated production possible, and (3) if their firms were called upon to accelerate production again in a very time-urgent scenario such as Desert Shield/Desert Storm, but also in a replenishment mode, and in particular in three increasingly demanding replenishment contexts of 24 months, 12 months and 6 months — what if anything the government could do to help industry achieve a ramp-up to its maximum capability. And what, in particular, these firms' representatives would recommend that the government try to work through in advance on an interdepartmental basis, or even just with the program sponsor, in order to make that possible. I'm pretty confident that all these speakers have agreed to comment at least on those three items and I'm sure they'll all want to talk on issues relating to those three. As the speakers present their remarks, their observations, and their recommendations this morning, we would like you to be considering the feasibility of these recommendations and what if anything your particular office in government or your department might be able to do in order to implement these recommendations. We'll talk more at the conclus of the session this morning and during the Q&A periods about building further interdepartmental prototype plans. Focusing on these firms and these products.

At this point, I've asked Mr. Harrell Altizer, who has had long experience with industry while he was in OSD, who is familiar with some of you through his affiliation with the National Security Industrial Association, and who has been encouraging me to do something like this for several years now, to say a few words by way of introduction of each of our speakers in order to set the context. Harrell.

Mr. Altizer: Jim also asked me to play the role of the guy in the black hat because, as you can see from the schedule, we have allocated 30 minutes for each of our speakers and we hope that during that period they will make their basic presentation and perhaps leave maybe 10 minutes for a little discussion. My role is that after the end of the 30 minutes I'm supposed to stand up and say "sorry, time's up," so we can introduce the next speaker. If we don't do that, then instead of getting lunch at 1:00 p.m. you're going

to get lunch about 4 o'clock this afternoon. I know a number of folks here and their topics and I suspect we could probably talk for about three days non-stop if someone didn't do something overt.

Some people think an army marches on its stomach; others think it marches on its feet. Falling into the latter category is our first industry speaker today, Mr. Horace Auberry, Chairman of the Board and CEO for Wellco Enterprises, Inc., which designs and manufactures combat boots. The threat of large-scale, imminent warfare seems to generally highlight new or additional requirements for specialized combat footwear, whether it's for the jungle, the Arctic, the desert, or whatever locale you happen to be fighting in. The requirements that came out of Desert Storm were fairly self-evident I think. Mr. Auberry has been directly involved in designing and manufacturing footwear for over 30 years. He has participated in the development and refinement of shoe manufacturing processes and contributed to several key patents used today in manufacturing: particularly military footwear. He has agreed to share with us some of his recent experiences in supporting military requirements — with emphasis on Desert Shield/Desert Storm. Mr. Auberry.

Mr. Horace Auberry: I did bring some product just in case there were shoe buyers here. Wellco is a small public company. We have about 30 million dollars in annual sales, we have less than 500 employees, we are technically though a large business because we have a major shareholder who owns a lot of companies and a lot of large businesses. Our main business is the manufacture of combat boots. We also make shoe machinery. We develop shoe manufacturing technology, and we license the technology and sell equipment to other manufacturers, including our competitors. About 65 percent of our sales are currently direct to the Department of Defense. Another 20 percent are in some way defense-related in that we have income from other manufacturers who do manufacture directly for DoD. We also have a good healthy export business, both for combat boots and the technology and equipment. We kind of specialize in turn-key factories for military boots or commercial footwear. We have such a factory, which is financed by our Defense Department, for the military of El Salvador. We have another for the military of the Philippines which is indirectly financed by the U.S. military. We have factories independent of the U.S. in Greece, Jordan and several countries in Latin America. About 15 percent of our sales are export and about 15 percent in the commercial footwear market and machinery market.

In July 1990, just before Desert Storm, we were operating our manufacturing unit on a C3 contract, making the standard all-leather issue combat boot. For those of you who don't know about C3, that refers to the Federal Acquisition Regulation [FAR] paragraph which permits non-competitive procurement for reasons of maintaining the industrial base. We were operating at around the minimum sustaining rate. In our case this was 1200 pairs a day and that's about 1/3 of our installed capacity based on historic production. We were making the all-leather combat boot and, in order to preserve our trained employees, we were operating on something less than a four-day week so we could have as many employees as possible trained and ready to go should the need arise. We weren't expecting Desert Shield but we were expecting a pick-up in our business. We considered our reduced production a temporary condition.

Also, during this time period, in our role as a footwear developer, we were performing a very low-key development contract for a desert boot that was initiated by General H. Norman Schwarzkopf in about mid-1989. If you remember the General was commander of CENTCOM for several months before Desert Shield, working out of Tampa. We delivered in late 1989 about 80 pairs of boots for field testing and I would say about 80 percent of the time when the General would show up on television, and that was a lot, he was wearing one of these 80 initial pair of desert combat boots that we produced in 1989. After the move south by Iraq, initially there wasn't any panic about boots at all. It seems a little bit strange but they were slow to realize that we might need more combat boots and that we might need a little different combat boot than the two major types that were then in the system. There was the jungle boot. That's the boot, you might remember, that has a green textile, black leather upper and with a stainless steel plate in the sole which was developed to protect the foot from the Punji stakes in Vietnam. It has a couple of drain holes in the side to allow the water to drain out after you've slogged through the swamps in Vietnam. The other item in the system was the all-leather combat boot, a very good boot but not particularly well suited for the hot dry climate of Saudi Arabia. There was a good inventory position of these two boots, something like three million pair. It was probably close to an historic high in inventory. I don't know whether it was a conscious decision or if it just developed, but the Defense Department determined to use primarily the jungle boot for Desert Shield, this green textile black leather boot that was developed for Vietnam. It really wasn't that bad a boot. I maintain very strongly that next to the desert boots, which were a later development, that the jungle boot was the best boot used by any of the forces in Desert Shield.

In August 1990, not in any way related to the Desert Shield, there was a contract action commenced for the purchase of additional jungle boots. This was just routine replacement of inventory but it involved a new item that was to replace the green textile black leather jungle boot we had developed with the U.S. Army, an improved version of the combat boot to better match the uniform, and several other improvements which are not so obvious. This contract action was commenced in August to purchase a quantity of those boots. At the same time, also in August 1990, we had responded to the desert boot development after a critique by General Schwarzkopf in Tampa. In about April or May 1990, he had critiqued this boot he had been wearing and there were some suggestions that came out of that meeting, so we made some new prototypes in August. In September there was some action in the development of the boot. There was an urgent development, and the decision was made to get a new boot in the system, a specific desert boot, as quickly as possible. To do this fast the idea was to make as few changes as possible. We were at that time just starting to make the jungle boot and in September the decision was made to adapt the desert boot. As you can see, the pattern is exactly the same, the manufacturing stamps are obviously the same or quite similar, but it does correct the two or three things that made this a not-so-great boot for the desert climate. The color of course is a big item. The change from the black heat-absorbing material to the tan makes about a three percent difference in the temperature of the foot. This boot has a steel plate throughout the inner sole to protect from stakes. There was a lot of talk about this, I think it was mostly just a perception, that this made the foot hot, that this metal plate picked up a lot of heat. So that was removed and we replaced that with a thermal barrier, an insulting barrier to protect the foot from the hot sand. Also, the Vietnam boots have a couple of holes here to let out the water and of course this let in sand. I think our soldiers were ingenious enough to stop those up with chewing gum or whatever, but still it wasn't ideal. Those changes were made and we developed the specs for this boot and it was contracted in October 1990.

By that time the mobilization had pretty well depleted the inventory of the standard jungle boot so they exercised all existing options, which were part of the contract, and converted about 67 percent of the pairs to this desert boot. Still it was only in about mid-November of 1990 that there was somewhat of a panic to the effect that we need more boots and we need the desert boot. We got calls from our customer, Defense Personnel Support Center [DPSC], asking for an all-out acceleration. Up to that time we were still continuing at this 1200 per day minimum sustaining production. And we went immediately from that to a full force. We were told to work all the overtime you can, make premium payments to your suppliers, if necessary use air freight, whatever you can do to get more

boots faster. Tell us what you can make additional and tell us what it costs and we're just going to add that to the contract value. We made a commitment to increase our production to 3000 pair a day by February and to make significant shipments of the new boot in December Towards the end of November when we were just getting this first Desert boot in production, we were asked to produce a special pair of size 11-1/2 R for General Schwarzkopf. I believe it was about December 7, Pearl Harbor Day, we got the news that General Schwarzkopf was not happy with our boot. The story went that he actually flung it at the guy that brought it to him. He didn't think nearly as much of that boot as we did back at Wellco. Part of that went back to the session in Tampa back in April or May when he had made a couple of specific suggestions. He wanted it to have a padded collar, particularly since his previous tour of duty was in Alaska and he wore in Alaska a boot with a padded collar and it worked out fine for him. And there were apparently three or four other things that we omitted getting in this boot that General Schwarzkopf had a particular interest in. Actually there were four specific comments he had: a padded collar, more ankle support, lighter weight, and more cushionability.

The Pentagon was kind of set back almost as much we were by this. At this point they had about 900,000 pair of the first desert boot that were under contract were just being cranked out. Everybody was very happy with the product except the General. The Pentagon spent a couple of days reviewing what they were going to do next. The decision was made to go back to industry and try to find a commercial boot that could be bought immediately off the shelf. There wasn't time for development any more and so they called companies in the industry whom they felt might be in a position to respond. They gave them the specifications that the General laid down and gave them one week to produce prototypes. In the meantime, all of our contract work was suspended. We were negotiating an additional contract and that was stopped. All contract negotiation was stopped. We were at a point where we didn't know if we had a future in the military boot business at all. We developed three prototypes, trying to interact and incorporate the General's wishes. The only technical problem was a lighter weight sole; ours is vulcanized rubber, which happens to be the best quality item for combat boots. It's flame resistant, it's chemical resistant, it's everything good but it's not particularly light-weight. So we had a real technical problem to get some weight out of the boot and we did it by analyzing each of the ingredients that might go into a boot. There are 3000 possible chemicals that go into a rubber sole; we were trying the lightweight combinations that were practical and still might work. We delivered our three samples to the Pentagon on Thursday evening, as scheduled. We made the three because while they all had the same sole, same rubber

compound, we couldn't quite understand what the General meant by the need for increased support. So we tried various approaches in the hope that we got the right one on that. We really felt it would be a while before we heard about this, but it was only Monday noon that we got the word that our boot had been selected. We then negotiated with U.S. Army, Natick, to provide a technical data package for the boot to make these in 103 sizes. This is the boot that became known as the General Schwarzkopf Desert Boot. It still is. There is a lot of similarity to the first desert boot. It does have the same color. We had to develop patterns in 103 sizes and full specifications, all that had to be done. We also made 184 pair of boots quickly for confirmation in testing.

We delivered the tech data package to DPSC on January 13, 1991. The tech data package was delivered on the 13th, DPSC issued the solicitation on the 14th, and we got a letter contract on the 15th. I maintain that is a record for development and procurement, 30 days from the first prototype to the contract. This made three new items in a period of three months. These were the new black item replacing the green jungle boot, we then went to the first desert boot model and finally the General Schwarzkopf.

Among observations at to what we would do differently, in our case the present system worked ideally, just what it was supposed to do. We had the C3 contract that kept us alive and kept us in the business; we were operating as we should have been by employing as many people as possible by working short hours so that we were in a position to increase production. We got, in addition to the contract that kept us in place, an additional contract for this item also on a C3 basis. And along with this contract came the concept of long-term procurement. We had a one-year basic contract requirement with two additional options for additional years' quantities. So the contract was in place and they were able to use those existing options to convert to the desert boot: very much of a short-cut to the procurement process. We found the cooperation of the DoD and their performance couldn't have been better. We got phone approval of any minor deviations. There was, historically, going back to Vietnam, a requirement that a boot must be in the curing cycle for 15 minutes. Somehow, at some time or other, it took 15 minutes to make a boot. But going in early, we presented a proposal that the cycle could be reduced to 12 minutes, increasing the equipment capacity of the industry by about 25 percent. And they accepted it without even testing. The down side of this experience is the chaos that we went through. Day-to-day shipments were diverted. We were making special pairs, the specifications were changed on the phone. But that didn't result in any permanent damage.

Letter contracts are not my favorite means of procurement. For those not familiar with letter contracts that means literally that you're given a letter which authorizes you to start production and establishes what turns out to be a maximum price, you're not going to get any more than that, and a provisional price which is actually supposed to be your cost. You invoice at cost, leaving out the profit margin. Then, some time down the road, your costs are audited and, through negotiations, you arrive at proper payment for the product. I don't know any better way to do it, but the extended negotiations while getting only partial payment surely could be better. For instance, we still, although we've agreed on the final price for quite some time, we still have not been paid this final payment for the Desert Storm contract. In addition, there is the statement for the acceleration. We are still owed a little more than one million dollars for our efforts on the acceleration and that amount has now been agreed upon and one of these days we will be paid. We don't get any interest on that. This is largely for work that was finished in April of last year. The bill has still not been paid, no interest. There is likewise more than one million dollars unpaid because of computer administrative foul-up. For some reason the invoices don't come out of the machine to produce a check. That goes back to April. This came about because of the diversion of shipments. A contract is specific to a shipment, to a size, and when you change that size to this and ship it from there to somewhere else, the system just couldn't keep up with that. At one point we sent a truckload of boots to Charleston Air Force Base and two hours after it left the factory we were called that it should go to Dover instead. And we were asked and we finally were able to contact the driver in Charleston and sent him on to Dover. We are also owed some $700,000 on modifications.

In sum, we started out with this green jungle boot. We got a contract for this black jungle boot. It was modified for the first desert boot and modified again for the second desert boot. We have still to get paid for much of this work. Altogether it's almost three million dollars and that is significant to our company. But that's a small downside. I think in all it worked and I can't emphasize enough that the system worked because we were given the C3 contract preserving the industrial base, that we did use it, I think correctly, but also they had a tremendous boot inventory, three million pairs. It would have been impossible to serve the needs of our country in this conflict if we'd only had even two million pairs. We wouldn't have done it. We wouldn't have got through with two million pair. That is basically the end of my outline.

Two questions for Mr. Auberry please.

Question: How long did it take for you to get the feedback from General Schwarzkopf? Would there be a way to shorten that process so you get better information?

Auberry: I think you've got a point there. I never worked directly with General Schwarzkopf. We were working through a couple or three layers. I do think that might have forestalled the first boot rejection if we'd been closer to the user at that point. That is a good point. But once Schwarzkopf rejected the first boot it was only two weeks time to get the reaction back. We were expecting him to be happy, and that was a bit of a shock. Then seven days after his wishes were known we presented boot #2 along with the industry's other eight and it was only four days, from Thursday evening, when they were at the Pentagon, until Monday noon when we had our answer.

Question: Earlier you indicated that once you had perfected the design, you licensed otherwise competitors who helped meet the demand.

Mr. Auberry: That's right.

Question: Were there any problems in doing that? Was there more capacity that you could have drawn on had things worsened?

Mr. Auberry: This is not new. The process for vulcanization of the sole of rubber to the boot was patented by our company long ago. We were in a position already of having four suppliers who were, in a sense, our licensees. We leased equipment to give them the technology, and they produced. So they were in-place and we just used existing agreements to give them the technology as well. We made about 3000 pair a day ourselves, altogether it was about 10,500 pair a day we were making by the first of February/

Dr. Thomason: You brought the other sources on quickly, within about a week?

Mr. Auberry: That's right.

Mr. Altizer: Mr. Glen Ailshie, President of SoPakCo, falls into the category of people who think an army moves on its stomach. This company produces and assembles meals ready to eat — rations. Most of us know this as the MRE. Millions of meals of the MRE were served to U.S. forces during Desert Shield/Desert Storm. Following the cessation of hostilities, hundreds of thousands of additional MREs were served to hungry Arab refugees. More recently we have served the MREs to Haitian refugees and to starving Russians. You might say, I think, that the MRE is becoming an international cuisine. There's no doubt that the MRE has proven to be the most nutritious and satisfying of emergency rations ever developed and produced. I've eaten most of them over the years and I certainly would agree with that statement. The MRE is a state-of-the-art product, light to carry, and with a long shelf life. Production in comparison to standard commercial food processing techniques is very specialized. Mr. Ailshie will discuss some of his production experiences and recommendations with us. Mr. Ailshie.

Mr. Ailshie: Good morning. I would like to thank you for allowing us in industry to come and be in such an elite group. Not many times do we get to speak back and say what we think needs to be said. So we thank you for this opportunity. We got to the fork in the road and we made a turn: when we were invited, we got here and we thank you. I won't bore you with a lot of facts about who we are. We started back near World War II, which was before my day, because there was a need for rations in World War II. They came to some tobacco companies and asked them to pack a lot of cigarettes and some other items together, which is kind of like some of the rations today but cigarettes have been removed from the supplements and so have some of the others. Ration supplements have many items, and they asked somebody to do that and the tobacco people came to us because we were owned by a tobacco company at that time, and wanted us to do it and that's how we really got started. I came with the company in 1960. This is my conflict, you might say, because I was just starting out in the company when the Cuban crisis hit. We were getting ready to do a contract and they were needing bread real quick down in Florida, so we had to put bread on trucks on a railroad in Tennessee, which was the place we were operating from at that time, and hustle it down to Miami to do whatever might be necessary . This was just uncompleted rations, it was just bread. It was shipped in to us just in cans. The MCIs did it. That was a very shaky time, as some of you might remember.

Then, of course, the Vietnam War came along and we ran three plants, one in Mobile, one in South Carolina, one in North Carolina. We did the first long-range patrol rations, which were very popular during the Vietnam War, as some of you might remember. And we did the very first one of those — those of course have about faded away today, but they were popular with troops there because they were light and easy to handle and there were some other things that they liked about them.

Most recently, and to address the questions pertinent to this morning, based on what we want to do here, is just address the question that was addressed to us, "Did you experience any difficulties in maintaining/increasing production of military items?" Let me say this, that our company is part of another corporation that is a holding company with sales of $250 million dollars a year, so SoPakCo's part of that is probably about one-half of the sales. Our ratio is probably 75 percent government and 25 percent "other". We are in the food business. We have two processing plants in South Carolina that make the pouches in the meals ready to eat [MRE]. We do the food processing, and we actually do the pouching, and then we have an assembly plant that actually does the assembling, which is the bag I just gave to you. Twelve meals go into a case to make up the combat ration today. MREs came on board in 1970s. We were running the last MCI contract and the first MRE at the same time in the same plant, which is pretty difficult. But we did it. When Desert Storm hit us we were already aware, from the people we deal with, that is, DPSC/Philadelphia, that there could be some ramp-up and quick.

We're one of the companies that has IPP mobilization, we're a planned producer and we're ready. We have a plan that's realistic. It's not a made-up plan. When Desert Storm hit on November 9, 1990, we were called to Philadelphia with a three-day notice with the plan. They said, "We want your plan." We went with the plan. Surprisingly, when we got there we were the only company with a plan. We were the only company with a plan that said yes, we'll go and do seven times what we're doing now to provide you with rations. And that's basically where we were headed during Desert Storm. We went from a MSR [a minimum sustaining rate] somewhere around 1.4 million cases a year to 1.3 million cases a month. Our maximum was about two million cases a month, but the government couldn't supply the product to us, from the government furnished material [GFM] side, to use the two million we could do and to keep the other producers in business also, to keep them going.

We were actually able to do two million cases a month of MREs multiplied by 12. It doesn't take you long to figure out how many meals that is, on a monthly or daily basis.

So we were able to do that very quickly. We were called back on December 8 or 9 by the General at HQ whose command in HQ DPSC said, "Fellows, we want to sign the contract now." I'm not quite as generous about filling those letter contracts as the speaker before me. We don't like letter contracts at all. Our experience with letter contracts has not been very good. With our first experience with MREs we went from the MCI contracts with the old supply contracts under IFB to request for proposal, which means negotiated contracts. We didn't know what letter contracts meant. We'd never had any experience with letter contracts, so they said "Down the road we'll negotiate." We were willing to do that for about three contracts before they ever got back to audit the first one. Then we found out what letter contracts were, and we had made it clear that from our position we did not want letter contracts and were not willing to sign letter contracts and this was not good news to the government, our best and biggest customer. And we had a lot of misunderstandings, I think, about that when we went to Philadelphia that day when the General said, you just have to do down there and sign this, we've got to go. And we said, look, we'll go but we won't sign it under a letter contract. So before the day was over we signed a firm fixed-price contract on about 950,000 cases to just get going.

We were in negotiations then for about another three months on about 10 million cases more to do over about a nine month period. And finally, two weeks before the war was over, we signed a firm fixed-price contract for over 10 million cases. Now this upset the government people we worked for, and maybe some of you in this room. I don't know if people were as upset with us over the fact that we would not sign a letter contract and here at a time when everybody was waving the flag and saying, "Hey, you guys are not doing the job over there, get on it." And we are flag wavers, and we are concerned, we actually did some work without a signed contract. We accelerated the present contract we were working on, we accelerated to the point where we were half way where they wanted us to be; by the time the war was over we were able to accelerate in 30 days. We started three shifts, we had three shifts working in all the plants, we were able to do exactly what our plan said we would do. We met our requirements according to the plan we agreed to.

Even without signing that contract, SoPakCo did what they said they would do. It was almost like a hand shake and we said, we'll do the job but we will not sign a letter contract. They were a little nervous because I guess they thought we might back out somewhere and leave them stranded. But also they knew we were a reputable company and had been with them for a long time. I think there were many people who felt like we would do like we said we would do. It was not just a healthy situation. And that did upset some people. So we did have to go from a warm base and a minimum sustaining rate of

about 1.4 million cases a year to gear up to somewhere around 10 million cases a year in that period. Now the two million is about our maximum sustaining rate. So we just recently had, last week, a group come in on the minimum sustaining rate study. They are working on that.

What is the minimum sustaining rate in peacetime? I think that's very important in our industry because our industry is very small and very fragile. We only have six people who can do a retort pouch. There are only three people who do the assembly. That's a very fragile base. Secondly, did the government provide you with waivers, etc.? Yes, I think the cooperation was very good, except negotiations on price — that didn't go too well, because they wanted letter contracts. However, I think they did move quickly on some of the waivers. I do believe that in a situation like Desert Storm we need to cut out some of the layers. I just heard the speaker before me. He went through many layers, I'm sure, to get to the General. And the General back down to him. And I think that there have to be some layers cut out in a situation like this that could have been very critical.

For instance, if we had not been able to land in Saudi Arabia, if we had to come out of Egypt to fight that war, we might still be over there. It could have been a real critical situation for many, many items and I don't think we'd have been nearly as lucky as we were, or whatever it was, to fight a war as we did and as successfully as it was. Because I think one of the keys was that we were able to land and set up next door to our enemy. So I don't know what would have happened had we not been able to do that. Under those circumstances, I think we'd have run into some real problems. We were very fortunate. I don't believe we have enough rations in the pipeline. I don't think they're keeping them out there because it was obvious to us that there were not enough, and waivers need to be taken care of quickly. I think they should cut out the waiver, go to the PCO and then it should go directly to Natick without having to go through the other route at DPSC where they have their own Technical Group. I think it should go directly to the maker of the decision and come straight back to the PCO. That would cut out a lot of time for us.

There must be a way to cut down on time and deviations and get things moving. For instance, we had to ship about 35 truckloads a day. Can you imagine what the dock looked like when our company was used to shipping five a day? And what that demanded of us? And receiving 35 trucks a day when we used to get five or six on a normal daily minimum sustaining rate? Going through that period of time we had to build ramps, and all this in the time we were scaling up for a warm base and moved up in probably less than 30 days. And that really took some doing. But we were willing to do that. And we were

doing that with no contract signed. They believed we could negotiate with them and they could trust us. It was a very touchy situation, but we believe in the system. But we just don't believe in the way that the letter contract pricing system works. We think there ought to be more innovative ways of doing business besides letter contracts. We are also owed many million dollars because it goes in to T for C [Termination for Convenience], and then "equitable adjustments" to spread the contracts out. At the end of Desert Storm we took the $10 million, it was slashed down to about $3.8, and then we agreed to extend it all the way to the end of this year. Then you have T for C equitable adjustment and Lord only knows when that will get settled. We don't know. And that's money we can't get. It's money that's very important to a company that's as small as we are and needs money to live on because it's critical in phasing down. It was obvious to us that they did not have enough in the system because they went out and bought tubs from Hormel and Dial and other people who had microwavable tubs out there and sent a lot of stuff over there that did not meet specifications. We had 500,000 troops sitting over there eating. The troops let us know by ripping off the cardboard and writing on it and sending it to us as a postcard. Rip the MRE open, write letters back to us, put our address on it, send it back, tell us all the good and bad news. We got some of both. Believe it or not we got a lot more good than bad. Most of them said we appreciate what you're giving us, can you change one or two things — and they don't know we don't have anything to do with the food to start with, we just do what we're told to do. Anyway, it was very interesting reading, we enjoyed it.

Another question: "Did the government at any level, did they allow you to raise your maximum producing capacity, to operate around the clock."

We did not get there in our situation. Because we geared up quickly and were able to give them rations even though our industry did not come through. I can't speak for the industry, all I can tell you is what we did. We had a plan. We were able to do more than they asked us to do. We never did get to our maximum sustaining rate because they never asked for it, because they couldn't supply the goods. This shows us that the government planning was way behind on MREs because they could not get pouches and many other things to send us in order for us to do the two million cases a month. We could only do 1.3, so the other two people were doing some and that was reasonable to want them to do that. But the industry itself never did get to their capacity that they had promised the government, and they had many problems with it and as an industry. I think in one way

we may have failed the government. They depended on some of the figures that were in the IPP plan that were not realistic. I think now that's the reason the team is going out and they'll be more realistic about what the minimum sustaining rate is and what the maximum sustaining rate is. That's a smart move and I'm glad to see it. You've got to know the facts and they have to be real. And that's what they are trying to do now.

I think it's a shame to have to go out and buy old stock out of the warehouses that is not selling in the commercial markets to send it over to our troops to be used. I know there are two sides to that. Some say, well it's a good change from MREs and I also know that the military is not using MREs in maneuvers like they should. They let them go out and get hamburgers and we hear all kinds of horror stories. We think they should use these and rotate the stock; it gives us a better feel for what the troops think of the product now, in maneuvers, not waiting until we get in a war. If there is something in there they don't like, let's find it out now. Let's change it because we can change it in a few weeks if Natick will test the product and decide what they want. Industry can make it and get it in the pipeline. But if you've got a war going on and somebody says they don't like chicken a la king and we don't want to eat that stuff, it's too late. We've already got it in the pipelines. It's kind of like the boot. You've already got it out there and somebody is going to eat chicken a la king 'til you can change it to something else, because you're going to use it. That's just the way it is. But there has to be a system, I think, to change things. There must be more MREs in the pipeline to keep this from happening in the future. We don't know when the next war is going to happen, but we know it will. It's an unstable world we live in even though it's become more stable in some areas. It may not be a big war that we have run to our cellars and hide out and all that, like we thought we'd have to, but probably we're going to have some problems across the country and across the world.

Question: "How can industry and government work together at several levels to accelerate production?"

Ailshie: I'd like to say, and I've been saying this since 1984 when I met with several people from the DoD level — and I had to do that because I had to go through Senator Thurmond since our plants are in South Carolina, I had to go through Senator Thurmond, unfortunately, to get that meeting held which I thought would be a meeting they would be glad to talk about — but finally through him we did talk about a "total systems approach" to these rations back in 1984 and again in 1989. But the government doesn't

want to change the system. They have reasons and they can give you a lot of paper work on why they don't want to change. The military, from what we've heard from the end user, really likes the total system approach because it makes sense. And all that amounts to is this: if they go out and buy, they buy a pair of boots from this gentleman just before me, they don't ask him to buy the sole and then the eyelets, and then we'll send you the top to put on it and then the liners and all that stuff to put in it, and we'll hope that it will work. Or we'll send you part of the chemicals and hope they'll work. But that's the way they do it with us.

They're supplying some portion of this and we're supplying a portion of it and we're trying to make this thing fit into a case that has to meet certain weight requirements. It makes more sense to me if the government says, we want a case of the rations, here are the specifications. You guys have been doing this for 50 years, you know how to buy this stuff. You know where the suppliers are. And we [SoPakCo] can control these suppliers without a lot of red tape. If we get something in that doesn't meet specs, they [the subcontractors] will get it back. And with the total quality management system that's in effect that we're required to have and want to have because it does work, Statistical Process Control [SPC] does work. Your suppliers will be SPC suppliers who have an item that you can trust them with, they have to be a good manufacturer under the SPC system and they'll be your supplier and you're not going to have the defects to start with. So you have better products. It's going to be a better quality. We'd have control over that, under certain guidelines, of course, by the military and by DPSC and Natick who have specification requirements. So it just makes sense to buy the unit. Why buy part of this stuff? I know it gets into that they want just so much of this for small business, and many other things that they're trying to save their hides on, and trying to get some of the choices. But those kinds of things are political things, I'm sure, that are hard to overcome. But it does make more sense to buy the unit. It's crazy to buy the Jeep and somebody else supply the tires and the other the steering wheel, somebody else the motor and somebody else the tail pipe or something, and say we're going to have a great Jeep come out of it. You know that won't happen. I just quickly went through this. My time is about up and I'll take questions.

Question (Joe Muckerman): How do you arrive at the minimum sustaining rate, and how much does an MRE cost when you're producing it at that rate, and how much does an MRE cost when you're producing it max?

Mr. Ailshie: We're going to find that out pretty quickly since this is being very carefully investigated carefully by all of us — industry and government — which is great, I think. I would suspect there would be a 20 percent difference in cost. I'm just guessing, that's just a wild guess. But there's probably going to be around a 20 percent difference I would suspect. It depends on a lot of things, what they want, the variations, but it could be that high.

Mr. Muckerman: Is it hard to find workers when you go to three shifts?

Mr. Ailshie: We're fortunate we're in two counties in South Carolina — Marion County and Marlboro County — in which the two towns we deal with are about 45 miles apart. That particular part of South Carolina runs just normally about 11 percent unemployment, that normal. It's as high as 21 percent part of the time. So the answer is no. It's very easy to find employees.

Question: How much management time was involved getting a plan and how did you keep it current? How much management time did it take to do that and have it ready to go?

Mr. Ailshie: Well, you're looking at two of us who did the plan, this fellow right here (Mr. Bill McCreary). He used to work for DPSC, by the way. I believe in hiring people smarter than you and that's what I try to do. And this young man is very intelligent. He worked there about four years ago when we hired him. He has the knowledge to help us get that plan together. He knows how the plan should work from their point of view. He and I basically put the plan together with all the other people down the line trying to give us information. It did not take us but two days to get the plan together, believe it or not. And the plan was a lot better than we thought. We hoped we had the plan right because we had to meet the General head on with it and say, here is our plan, we can do it. And it helped because we were able to do it.

Question: Do you keep this plan updated?

Mr. Ailshie: Well that's what we're doing now, the MSR and the maximum sustaining rate, yes. On the mobilization plan, yes.

Question: Do you anticipate the possibility of a civilian market for these things?

Mr. Ailshie: No. I wish I could tell you that everybody loves them. But you know everyone tells us that the campers will like this one. Campers won't buy this, they'll go buy beans and franks and pack out. A few people will use them, yes, but it's not a market, per se, no. We're into the tubs by the way, and we do some of the trays for other customers. We're a contract packager and we're hoping to increase in that, but our business is mainly the government.

Mr. Altizer: We decided to again show you the agenda and point out that we are already a bit late in spite of my heroic efforts to the contrary. Perhaps if the speakers could limit their basic discussion to about 20 minutes and then leave a little time for all these wonderful questions that are floating around, I think it might be a good idea. Also I want to remind you we have suggestion box if you don't get a chance to ask your question. Somebody, like Jim over here, will get you an answer in almost no time at all.

Our next speaker is John Novak, the production manager for the Patriot missile at Raytheon. The system was started in 1965 when it was known, as some of you may remember, as the SAM-D missile. It has evolved over the years into the fine system which provided distinguished service during Desert Shield/Desert Storm. The ability of DoD and Raytheon to quickly deploy and operate the Patriot System in a combat environment was critical from both a strategic and psychological viewpoint. The quality and effectiveness of the Patriot System is recognized and exemplified by the military sales to such countries as The Netherlands, Germany, Japan, Saudi Arabia, and other countries. Mr. Novak will discuss with us how the production of this important system was affected by the Desert Shield/Desert Storm operation.

Mr. Novak: I wonder if Joe, Joe and Jim, set up the sequence of events here this morning. We've got the soldier with nice, warm, comfy feet and bellies full and now we'll

tell them about what the troops can use. I was the program manager on the missile launcher during Desert Storm/Desert Shield. I'll take just a second to relate what happened in the early weeks of the crisis. We got the phone call, myself included, "Are we ready with the new missiles?" And we said, "We're slowly getting into production." "Can we get it ready within the next few weeks and deliver some missiles to Saudi Arabia before Labor Day?" And we said, "Give us 24 hours and we'll see where we're at." The next day we were told to accelerate the new missile, which I'll describe to you and go through the steps we had to take to accelerate to get the missile ready.

The Patriot System, of course, at this point is on or ahead of schedule. There are 125 fire units and 5400 missiles delivered. The type of missile that we delivered to Desert Storm is called the PAC-2 missile. There are presently at this time 1600 of those built. At the time Desert Storm and Desert Shield started in August, we only had three of those missiles and by the end of the year we had close to 400 to 500 missiles. I want to take a minute and discuss the quality of the system because that's going to be critical in our discussion as to where we were with the system and where we are today and where we were last August. It is rated at 96 percent worldwide readiness and has a field reliability acceptance is seven times specification. That's where we go in and run each radar system for 150-160 hours to prove that it's ready. Current national programs, as Harrell mentioned, are Netherlands, Germany, Italy, Japan, Saudi Arabia and Israel. The Anti-Tactical Ballistic Missile [ATBM] capability is what we used in Saudi. The Patriot System was originally designed for anti-aircraft, but was being operated for the Anti-Tactical Ballistic Missile capability as deployed in Saudi. We had 17 of 17 test successes and of course we successfully fought a difficult wartime Desert Storm threat capability.

The firing unit consists of a radar and an Engagement Control Station [ECS] along with an electric power plant, an antenna Mast Group and up to as many as 16 launching stations with four missiles on each launcher. It was the upgraded missiles that we had to accelerate. Performance was validated prior to Desert Shield and therefore we were ready in August 1990, and that was so key to the success that we had. To this point in time we had performed 2000 search track tests and we had checked the system over its full envelope. We had over 200 live firings over the full envelope versus aircraft targets. Since we introduced the new design, ATBM capability, we have had 17 for 17 TBM successful flight tests. We have had multiple successful operations in Europe and the U.S.

The Patriot has been in production since 1980. We started deployment of the system in 1985 and the new missiles were initially deployed in August 1990. The Patriot

System was sent to support Desert Shield right along with the 82nd Airborne. To relate from my own personal experience, my son-in-law was in the 82nd and he was one of the first to arrive. So we can see the enthusiasm and motivation was there for me. The Patriot System was the first to be deployed and was the only system at that time which had any ATBM capability. Patriot arrived by C-5s and C-141s. We went in to defend airfields, national strategic assets, and troops in Saudi Arabia, Israel and Turkey. Most of the units were placed in fixed positions, although some systems moved with the troops when the troops started moving in Saudi Arabia. The Patriot missiles saved lives and were very effective in Desert Storm. We did have spares available to maintain the equipment. We weren't going to deliver the PAC-2 missile until January 1991, but because of Desert Shield we started to deliver them in the last days of August 1990.

Before Desert Storm started, we had 550 missiles delivered and I'll show you how that rate developed over the months. We introduced the software five months ahead of our plan. When we introduced the new missiles, we had to update all the software in the system. We did that in the time frame of August 1990 and again five months in advance of when we had planned to do it. We had to immediately crank up the flight and system tests to make sure that the software and the Patriot hardware functioned properly. While the systems were in Saudi Arabia, Israel and Turkey, we did two additional software changes and that's key to any new type of system deployed today. We deployed 42 Raytheon personnel into the theater, with 23 to Saudi, 15 to Israel, and 4 to Turkey. When we started delivering PAC-2 missiles, we had nine missiles by the end of August 1990. In September we were up to 95. As you can see, there was an extreme jump from December to January, 424 up to 619. What we ended up doing in this time frame was to accelerate more missiles just before Desert Storm started. You only have so many assets available to you in the plant. We said, let's take some of the missiles from the field, and upgrade the missiles to PAC-2. As you can see, we ended up with producing 195 missiles that month, compared to an average of 104 the previous four months. This was possible because we were converting and building new missiles at the same time.

Now, why were we successful? That's because the material was there! We had a multi-year program, we had the material on order before we were told to accelerate, and all vendors and subcontractors were in total production. That was key, and I think that's key for anything we look to in the future, to be prepared ahead of time. You can maybe turn around making food and boots in 30 days, but you're certainly not going to turn around producing items associated with high technology and electronics.

I'll walk through the five questions we were asked to address. But before I do that let me just mention some of the key things that we found present that lead to a successful acceleration. Team work between the Patriot project office, Raytheon, and key vendors was what made us successful in getting 500 or so missiles out before Desert Storm. Let me relate why it's key to have multiple sources. In the case of the warhead — which is made up of liner, a base, a bunch of fragments, an explosive train assembly, and the explosive itself. We had two facilities building the warhead at the time Desert Shield came about. We were building the warhead in Germany, and we also built the warhead in the United States. We would not have met the requirement for missiles in September without combining efforts from both facilities. We actually brought unloaded assemblies that did not have the explosive train assembly nor the explosive from Germany and loaded them there in the States. They were the initial warheads that we inserted in the first missiles. Then as both vendors came on board, who we were telling to produce five months earlier than they had originally planned, we were able to accelerate and start delivering full-up warheads from each vendor in late September 1990. So we had close to 95 to 100 missiles in theater by the end of September. We used U.S. military, commercial, and charter transportation to move material. What did we design PAC-2 for? What was the difference in pre-war information about the theater ballistic missiles and the actual characteristics that we encountered when we were there? You can see in some cases the TBM velocity was consistent with range. There were a couple of other things here, like how did the TBM react, the slow down of the missile itself. We said it was small and predictable, but as it turned out in actual characteristics the slow down was large and it was very unpredictable.. So we learned an awful lot as we started the operation.

Here are some of the lessons we learned from Desert Storm. The first is so key. An in-place production base is vital to accomplish surge capability. You can't expect to surge any kind of sophisticated technology as the Patriot System without having production base. The hardware reliabilities resulted in high system readiness; we had the system well proven out. Software-driven systems allowed a quick response to changes and to any unexpected threat that may come up. The TBM threat is great and growing. I'll just go through this quickly. Proven ATBM capability is highly desirable and we are doing some growth tasks at the present time. Deployability is highly desirable. Make sure that we can move it fast to wherever we want it. Real time data collection is critical for future conflicts, to know what's happening at all times. Troop training proved to be very, very excellent.

Now, in closing, the Patriot System continues to be a model of success for Germany, the Netherlands, Japan, and Israel. We do build the Patriot System in Japan,

and Germany produces at the present time some of the parts for the system. The Netherlands had built modules and displays in the Patriot System. Patriot is a critical element of U.S. contingency operations and it has multi-threat capability against aircraft, TBMs, and cruise missiles. Near-term ATBM growth: Launchers on a truck are in design to be able to deploy quicker. Long-term improvements are in the process for Patriot. It is so important to have a warm production line if you're going to surge equipment.

The five questions we were asked to address: (1) What kind of regulations do we run up against? With the enthusiasm among the team members, project office, vendors and Raytheon, there was basically very little that we couldn't do. One problem we did have when we tried to ship these warheads from Arkansas into the missile assembly facility in Florida was to find an explosive carrier. After some time, we did find one in Arizona. That's the only thing we can think of so far as regulations go.

(2) There were some minor waivers that we had to introduce as we started accelerating. Nothing jeopardized or compromised quality or reliability. One of the major waivers was the fact that we had all of our drawings in typical data packages for the PAC-1 missile and the PAC-2 missile, but we didn't have a document package for the converted missile. When you convert a missile to PAC-2 you continue to use the propulsion and control sections, but each type missile has its own drawing package. So instead of making an entire new data package, we did develop a waiver that permitted us mixing the afterbody with the forebody of the missile. It's key that priorities were available for military aircraft for shipping missile forebodies into Germany. We moved hardware with charter planes, commercial planes, and military, both German and U.S. We ran into an x-ray problem. Once explosive train assembly and the explosive material is inserted into the warhead, you have to perform an x-ray. The x-ray facility was overloaded and the project office and the Army found an x-ray machine and helped us tremendously to expedite that task.

(3) Recommendations for handling surge orders: Whether it is through a letter contract or an existing contract, the recommendation is to initiate activity as fast as possible. The next thing is also, define the customer, contract or team players and the relationship they have. For example: who would I call when I have a problem? If I have something that normally isn't done in that method, how do I get around it? Who do I call? Whom do I trust? It takes a long time to reach maximum capacity. It boils down to, you have to maintain a warm production baseline. If you don't keep that baseline warm, you'll never be able to accelerate as we did with Patriot. Assist in identifying unique fabrication processes, and maintain that capability. I have another picture which I don't think we'll

have time to talk about. What are the things we should worry about in the future if the military is down-sized? What should you maintain as high priority, technology items, fabrication processes, and manufacturing techniques? Assist in identifying sole source vendors, high technology vendors. There are a lot of them. There are a lot of them that operate today but are going out of business in the near future. Every other day we get a call saying, I don't want to make that integrated circuit anymore. I don't want to make that part anymore because there's no money in it and I want to get out of the military business. I want to go into commercial business. The presentation I have — maybe the next time when I come down I can give it — lists these kinds of problems and goes through some recommendations. I think it's very key that government and industry cooperate to plan for future, have them on the books so that you can start cranking out a plan. Identify and maintain better process capabilities. It is so key in the technology we're talking about. High technology items. Maintain inventory of all long-lead material. If you want to accelerate within a few months, you've got to have long lead material available and ready to go. Questions?

Mr. Joe Moreland: What about the skilled labor — wouldn't that become a limited resource?

Mr. Novak: Yes, it would. We went to 3-shifts, 7 days a week. I'll just describe a little bit about the missile. The missile forebody is built in one location, the people there are all trained. When we had to bring in new people, we had to train them for the other shifts, so we were lucky we had the Hawk missile in the building at the same time. A lot of those people were trained in those types of activities, we brought those people on board. But skilled labor is very, very critical.

Mr. Dick Oliver: What skills in particular. Could you identify a few?

Mr. Novak: Just look at the radome manufacturing. Your don't just get anybody off the street to go through the process that all takes skilled people. Let's go to the TWP. For this, you may have a number of TWP manufacturers out there, but the manufacturing steps take unique skilled labor. I could go on and on. Another item is the safety and arming device, which is a GFE item. There aren't that many people out there that make

safety and arming devices. The missile warhead fuze was a very key element. It is GTE and there is skilled labor associated with this item also.

Question: Did your people handle the training of the military operators?

Mr. Novak: Yes, when we went into Saudi, all of the Army personnel were trained. We have a training contract at Ft. Bliss, right outside of El Paso, so all of those people were trained. They were ready, they knew the system. The Israeli troops were here being trained. They weren't as familiar with the equipment as the American troops were. They were actually pulled out of the school when we deployed the system to Israel.

Question: Was that the reason for identifying the system's performance difference in Saudi Arabia, and Israel? And is it likely to be repeated in other regions?

Mr. Novak: Yes, if you don't let trained personnel handle the equipment who are proficient in operating the equipment, operating performance can be different. In the case of Israel, they did not want to go to an automatic mode to operate the system. But when you are tracking a fast reentry target such as this, you do not have time to think. We have an automatic system that would detect the speed of the target and evaluate other parameters prior to implementing the necessary solutions to engage it. In Israel, there were manual operations. They were still building confidence in the system before placing it into an automatic mode.

Mr. Rick Meyers: Was the Defense Production and Allocation System [DPAS] and DX relevant in the Patriot acceleration?

Mr. Novak: Yes and No. We found that we had one item, a gyro, which could have been a very limiting factor getting the missiles out as we wanted them. And the vendor said, can you get us a DX rating? We could not get that DX rating fast, so we took it to our management and they talked to the Northrop management and just said, you've got to not only supply your other equipment that you have DX rating for, but you have to help us out. And they did. We did have the request in. We did request the DX.

Mr. Meyers: That's why I asked the question. We were very much involved in some of the needs that you had. The gyro I don't recall.

Mr. Novak: We solved it by ourselves. Our project office said, go solve the problem please.

Mr. Meyers: During the big push, a lot of time was wasted in trying to elevate the Patriot missile to DX. It turned out that the DX rating was being issued for items, but we ran into a number of problems with subcontractors who were saying, "Well now, what do I do, I have this on the Patriot, I can't do the DOs on the other critical system being built." It does cause some problems.

Mr. Novak: I think I cannot emphasize more that team work, enthusiasm, the efficiency of all concerned was what really made the acceleration successful.

Mr. Muckerman: How long could you have maintained that surge rate? When would you have gone into the so-called bathtub effect?

Mr. Novak: You've asked a very, very good question. General Sullivan came into the plant, in January, just after Desert Storm started. We worked until 2 o'clock in the morning the night before answering his questions before we made the presentation to him on Saturday morning. What are your capabilities, how many missiles can you give me in the next four to five months? We didn't know how long Desert Storm was gong to last. We said we would supply him with 150 missiles a month, combining the converted existing missiles and new missiles, and we will maintain that through the month of August, 150 a month. We started with that plan and thank God the war was over when it was because one of the items, we just couldn't get enough of. The item was GFE and a sole source item. The problems with supplying this assembly were the lack of components from key sources. This type of problem could occur with any sub-assembly if insufficient quality standards or improper planning are not in place.

Question: A foreign dependency question: The total system, the one you discussed, the warhead I think — to what extent are you relying on foreign sources, how secure it is, how do you make the determination and was that surge when you changed some of the components in that, I guess it was, the warhead? Just per chance the foreign provider...

Mr. Novak: Yes, just by chance. It was not thought out to be.

Question: Your vulnerability... assurances that... very interesting.

Mr. Novak: That other presentation really gets into it. If you want to maintain the type of technology that we need with downsizing coming in the future, we must start to look at the global picture and look at foreign countries to build some of this equipment for use and help us.

Question: What is your capability to do that? And what do you need from the government?

Mr. Novak: Military sales, foreign military sales.

Question: What problems did you have with this one that you didn't have with the last one?

Mr. Novak: Key items. Availability, one is the GFE. And that again is in the other presentation. GFE is excellent in many cases, provided the GFE has a couple of sources. When the GFE is a single source, not limited to yourself to development, the availability of the item can be critical.

Question: How much could be built commercially ...?

Mr. Novak: That's a good question. What am I building today, and could have a commercial outfit build tomorrow. And we've gone through that and there are some items that could go commercial.

Question: ... Are there some things you would need to surge production of vs. things with a long shelf life in normal use that you could cut out in your surge production.

Mr. Novak: Yes there are. The shelf life of items, we're trying to upgrade them all the time, like thermal batteries, are throughout the missiles now and that has greater than a 20-year life. But that key item is not manufactured in very many companies in the U.S. or Europe.

Question: You say you sent about 40 people over there [to Saudi]. What were they doing? Were they normally with units or were they doing something special? Was it difficult to get good people to go over?

Mr. Novak: No it was not. There were a lot of volunteers and there is a normal contractor support function through logistics, and they were there to have questions answered quickly. If something with the system is not operating normally, they knew the answer and fixed it. There was tremendous cooperation between contractor and the operators.

Mr. Altizer: Lane Bonner is the Manager of Government Sales for Siebe North Company, of Charleston, South Carolina. Siebe North is recognized worldwide as the technological leader in the development and production of many kinds of sophisticated polymeric gloves made by the challenging Solution Dipping Process. In the early 1970s this special expertise led to the joint government/industry development of today's technically superior chemical warfare protective gloves made from butyl rubber. Mr. Bonner has been with Siebe North and its predecessor company since 1962 and in his present position since 1978. He will discuss production and industrial base problems associated with the manufacture of this critical item in an emergency environment. Mr. Bonner.

associated with the manufacture of this critical item in an emergency environment. Mr. Bonner.

Mr. Bonner: First of all I'd like to pass around a glove set, chemical protective, which consists of a pair of rubber gloves, a pair of cotton interliner gloves and an instruction sheet. The cotton liners absorb perspiration. These gloves are chemical protective, or better known as chemical warfare protective gloves. They've been long designated as key mobilization base items. The two designated planned producers are ourselves and the Brunswick Corporation. Each producer has an operating capacity of about 3.2 million pairs, and since about 1984 or 1985 both producers have been maintained in a warm mode by firm fixed-price negotiated contracts, some of which are letter contracts, to our consternation. The DoD Procurement Activity for this product, as it is for some others here this morning, is the Defense Personnel Support Center [DPSC] in Philadelphia, and clearly, we all share some problems there.

Throughout the term of the Middle East, Siebe-North was never actually requested to accelerate production or deliveries. Such actions were, however, implemented after the war. So while we believe our company's participation in this seminar may therefore seem inappropriate, we believe that important lessons can be learned from our experiences.

The following chronological sequence of events with comments will illustrate the key points which we believe need to be made.

First of all, when we, like anybody else, see articles like this in the news media — this happens to be *Newsweek*, August 20, 1990 — we have reason to suspect that we will be called upon to accelerate production of our gloves. Therefore it came as a surprise that the more time that passed, that never really happened, until it was too late.

On about the first of September, DPSC began weekly and monthly verbal requests to us for updated production and shipping information, but at no time was there a request for acceleration of either— it was just a reporting function.

On the 29th of October, DPSC routinely issued new solicitation for a typical annual MSR contract. Because of the necessity of correcting certain errors which we had detected in the specification, the bid closing was delayed for about a week. I make this point to point out that had this been a critical need, that we probably, on down the line, would see it could be quite important.

On the 9th of January 1991, we were awarded a contract — although it was not really signed by the contracting officer 'till the first of February —.for 827,148 pairs of chemical protective gloves. This was an average size MSR maintenance contract. I thought it a bit unique that although it was clearly labeled "Desert Storm," and while in fact they gave a DO Desert Shield designation to it, at no time during the performance of that contract were we ever asked to accelerate it.

On the 16th of January 1991, the air offensive began and still we had no request for accelerated production. Then we finally began to see some action on the first of February 1991, when DPSC issued a solicitation for an additional 708,408 pairs of gloves clearly planned as an exigency procurement. Rubber stamped was the "Desert Shield" legend. By then we were in "Desert Storm" so we kind of wondered about that! Offers were due only seven days after issuance of the solicitation, which was a mind-bending exercise for DPSC. I believe they had never asked for one that quick before. This one did permit acceleration of delivery, and delivery was to be completed in four monthly increments with a liquidated damages clause. I'm sure you all know what that is, but it was not typical for earlier contracts.

The ground offensive began on the 24th of February, and by the 8AM Riyadh time on the 28th of February, the war was over. At no time between the receipt of the offers on 8 February and the end of the war was there any indication that the contract was about to be awarded, nor was there the customary request for best and final offers.

On April 17, 1991, offerers submitted best and final offers on this exigency procurement. This was what I thought you'd find interesting about our situation — they still retain that urgency status even though by this time the war was long over! The award was made as modification to our existing contract. We took steps to increase production.

On 6 July 1991, the contracting officer ordered that the accelerated production stop, and that the remaining product on that amended contract be added on at the MSR rate at the end of the original contract.

The conclusions we reached from this are these: Our situation is quite a bit different from others of you. DoD was extremely slow in assessing what its need was for additional chemical gloves, if any, and by the time they finally did get around to it, the war was nearly over. When an "exigency procurement" — that's a mouthful — was finally promulgated, the products to be provided would only have become available at a date after what I was later told was General Schwarkopf's worst case estimate of a 60-day ground war. And that would have been even if the contract had been awarded promptly. I've come to the

conclusion that the procurement process — at least at Defense Personnel Supply Center — is so hampered by process, regulations, and a lumbering pace, that it seems — in our case — to be almost incapable of decisive action.

I think part of that is the diminishing responsibility of the contracting officer which has so obviously occurred over the years. A contracting officer, no matter how well qualified —and ours is extremely well qualified — can exercise very little initiative without oversight approvals from various levels. It really slows things down. All these people seem to be busy all the time. There is no schedule that means anything, dates are missed. What can you say?

In trying to answer the five questions which Dick Cheslow's letter asked of us, first of all, we would not have been hampered in increasing production by laws and regulations at the federal, state and local levels. That assumes that we had been able to continue operations at the Minimum Sustaining Rate level. Once we stop that, we really don't know how long our permits for toxic emissions and these types of things — hydrocarbons — would remain effective, since there are other people waiting in line for authority to do the kinds of things that we are permitted to do at the present time. We exhaust about 10,000 pounds of hydrocarbon solvent into the atmosphere every month at the MSR sustaining rate; that is with a very sophisticated capable solvent recovery system in place. It's just part of the losses which occur. We use a lot of solvent!

I think had it been necessary for the government to help us — and it wasn't necessary — but had it become necessary, it could have done so in a number of ways. The first and simplest thing would have been to rescind the prohibition against accelerated deliveries of the contracts which were already in place, and ask us to accelerate to whatever level was desired. We would have been happy to do that. We were never asked. Second, it could have employed — as a matter of fact, we have employed it ourselves in the past — the DPAS system to good use. We found, with all due apology to the gentlemen from the Commerce Department, that we are equipped to get it done quicker if we do it ourselves, and write letters that sound like lawyers wrote them. Simply read, the language of the law and we can move in a couple of days. By the time the Commerce Department gets around to filling the forms, the emergency has gone away. I meant to smile after that!

The government could have prioritized some of the required laboratory testing of our products. As you can imagine, whatever is supposed to protect a person from chemical warfare agents ought to be tested for that purpose. We don't deny that for a minute. We don't want the stuff on our premises; in fact, we're not allowed to do so. So, testing has

been — has to be done by a government laboratory. Once we get a shipment all ready to go and we send a sample off to a lab at Aberdeen Proving Ground, they have 30 working days, by contract statement, to perform that test and get results back to us. It was, at the time I wrote this last Monday, taking them about 70 calendar days to get this work done, where the actual testing itself in an emergency could easily be done in two working days, and that's allowing some time to prepare samples and write the report, etc. So there are some ways that production could be speeded up.

From our viewpoint and experience, surge orders in the future for our company could be speeded up in a number of ways. Number 1, the contracting activity should be required to have developed, and have on hand, as one of the regulations calls it, an "approved exigency procurement plan" for every key item. I don't think the existence of IPP schedules — and this is quite frankly an almost bureaucratic approach to this on the side of the government and ourselves every year because we never know what it means— is a meaningful document to work with in a real emergency. What you want in an emergency is some action now. One thing that occurred to me that would work in our case and probably would work in cases of others as well is to put into every contract that we currently have, or will be awarded in the future, a clause — what's one more clause! — for some exigency situation, which might simply say that we accept this contract in a national emergency; you accelerate production, and so on and so on, and continue at that level until advised otherwise, the maximum price not to exceed so much per unit. I have never seen anything like that in any of our contracts.

We believe we could reach our maximum capacity, operating around the clock, within six to nine months or less, without any government help, based on present circumstances. That assumes an available labor pool. It also assumes a pre-existing sustaining rate-type operation where we have the key people on board, the sources of supply routinely delivering materials to us, permits in place and all those wonderful things.

There is a 5th question which the letter asks and I'll try to deal with it. That question essentially asks: How can industry and government work together better? I think it contains its own answer. If there is truly some way for industry and government to really work together, both parties could benefit from it. We have felt for some time that the procurement process today is one that is conducted by opposing divorce lawyers. We have to hold some cards close to our vest, the contracting agency, and the contracting office has to do so because they have such limited authority, and the information flowing in to him as to time frames and patterns of activity don't seem to mean anything to anybody. We think

there really is a lot of room for better cooperation and some of you here seem to be getting it [cooperation]. The gentleman with Wellco finally got all kinds of miraculous things done with technical data packages in a matter of days and with us it was more like months or years. So I think there is room for improvement there.

Finally, I want to say that, lest my cynicism gives the wrong impression, from the onset of the Middle East hostilities we offered to boost production and it was as honest and as sincere and as patriotic an offer as anybody else could have made, and it was only taken up too late in the usual ponderous way. To this day we are not really sure whether or not the government actually needed those gloves that were called for in that exigency procurement.

Finally, I have a statement in here that I want to recognize one of the really good people in government. I've known a lot of them over the years, but one who has been very helpful to us and that is my good friend Bob Fabrie in DLA. He has done a grand job guiding us in the way of the righteous. Thanks very much. I'll take questions you may have.

Question: Do you have any insight into whether the delay on the government's side in issuing that request was due just to the normal inertia in the system or to specific barriers that might be identified?

Bob Fabrie May I answer that? We've got so many rubber gloves that we don't know what to do with them. Real problem is how to keep industry in business.

Question: That's part of my question. So there's no shelf life to these gloves?

Mr. Bonner: Well, I want to qualify that. We could put a pair of these gloves on the shelf and take it down and test it several years later for all its physical properties, that is, its tensile strength, its elongation, its hardness, and all these wonderful things, within specification limits. We have no way of testing these gloves for their ability to resist chemical agents. There is a little bit of what may be called anecdotal data on that and what there is indicates that as the gloves get older, they do lose some of their ability to challenge

the agents. I don't think it's gone nearly far enough to determine what the shelf life is in terms of its field serviceability under actual combat conditions.

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Mr. Altizer: Desert Shield/Desert Storm highlighted the operational significance of many military items that are often taken for granted by our planners, or sometimes they simply disregard it. I believe that no item characterizes this problem more explicitly than the Atropine automatic injector. This item delivers the antidote for nerve agent poisoning and is administered by the individual service man or woman. During Desert Storm, as you may recall, the possibility that the enemy would use nerve gas was a constant dread. Survival Technology, Inc., the producer of the Atropine injector kit, has supplied over 67 million of the injectors to U.S. and foreign governments and played a critical role in the support of Desert Storm. This morning, Mr. James Miller, who is President of Survival Technology, Inc., will discuss with us some of the interesting experiences encountered while providing the increased support. Mr. Miller.

Mr. Miller: Our experience in Desert Storm probably falls in the middle of the companies heard up to this point, and in general was really quite positive from a number of aspects that I will talk about. The Grumman representative and I would like to thank the other speakers for consuming most of the time. But nonetheless, we both intend to drag out our presentations. I must admit I was grateful when I was listening to the first presenter that he kept General Schwarzkopf focused on his feet, so the General didn't try to use some of his creativity in nerve gas antidote injector design. We would have been in serious trouble. So we're all very grateful to you. I'd like to cover here the issues that have been requested. If I don't cover them, please let me know. I may not do anything in the specific order in which they were asked.

Very briefly, I'll discuss what we do for anybody who may not have watched CNN during Desert Storm, anybody who did knows what our products are. I might talk about the ramp-up for a small company, a company that is in the $40 to $50 million dollars range,

and that had visions lower than that before Desert Storm. There were specific events that occurred to us before Desert Storm, but I would also like to talk about the era of post-Desert Storm, which is particularly critical to us, not unlike the previous speaker on gloves. He talked about how do we keep this base warm or do we need to keep this part of the base warm. This is the product that they were talking about on CNN. Our company actually invented nerve gas antidotes. The founder of the company did, some 25 years ago. The injector is a quick, easy, safe, relatively painless way for a non-medical professional to intervene in his or her own emergency health care prior to having any medical expertise arrive on the scene. Naturally, the principle of it and — when our company started — the mission of it was protection of the serviceman on the battlefield in case of nerve gas attack. Desert Storm was the first time that we know of that our forces were faced with potential threat of nerve gas since World War I, so we were very pleased to be there. We were equally pleased that our products were never used. This is the Mark I that people carry in their gas kits; they carry three. Atropine blocks the action of nerve gas, ferodoxine chloride is injected to help return the body back to normal balance. We traditionally give three of these in a row, and having already protected yourself from further insult by a gas mask, gloves and other clothing, having given yourself three subsequent injections in a row, you have to leave the battle scene. They are truly a lifesaver, as the effect of nerve gas can be very, very quick if it is given in large enough doses or if you're close enough to where it is concentrated. It can be a matter of three to four minutes to death. Again, if you inject yourself with this device, your life will be saved. During Desert Storm and prior, we produced a family of products, and I won't go into that, but we did sell significant levels to the Department of Defense and also some to allied countries like Saudi Arabia, the United Arab Republic, and Israel — who has been a customer of ours for a long number of years. If you look at what our company traditionally was just prior to Desert Storm, you can see that we had peak production years. Again, while we are neither as large or perhaps as sexy as Raytheon in Patriot missiles, problems in all businesses are the same. The decimal point may be in a different place, but the problems of adjusting are just as critical to a small company as to a large company. As you can see, at the end of 1988 the production of our nerve gas antidote went down dramatically. For one year we actually operated under a service contract with incidental production. The production rate was about 250,000 units a year. Obviously we had to pare back our employment by a considerable level, but we still had a warm base.

We received a call on August 3 and were asked, "How many, how fast, if asked." We had — like the other companies — done considerable planning in this area and

basically knew the answer. The answer was yes, we can gear up and yes, we can gear up fairly quickly, but there is a lead time for this —to get components. And there's simply nothing you can do to speed up that process. We met, as I recall, two to three days after that. We opened what has now become the infamous letter contract, which in our case worked out very well. I think that's the subject of another meeting. It is something that neither side likes, but at the moment it is the best way to get into production quickly that I know of and we got into production very quickly. Our plant went on seven days, three shifts within about two weeks. We actually had scheduled a plant shutdown at the end of August. We run a sterile facility, and we generally close down for a couple of weeks every year to revalidate sterility filters, etc. Most of our direct labor employees take vacations during that period of time. We canceled the plant shutdown. As a matter of fact, every employee problem — and we have a union — but every union, non-union problem disappeared during this conflict. Every employee but one, gave up his vacation, and that individual had invested a lot of money in a trip and we understood. But all of our other employees canceled their vacations to go back to work. So we had an enormous bulge of production in 1991, going from 250,000 units in one year to over five million units in one year. And while these are not as complex as the Patriot, there are a lot of parts to these autoinjectors. There is quite a string of vendors from whom we buy components. There is a portion of it that is a sterile fill, so there isn't anything that you can do quickly. We did this all in the same facility with basically the same equipment. Our delivery peaked in February, at 1.3 million units. There's no real significance to the variance of this from September through February, it just happens to be whether the shipments were available at the beginning or the end of the month. But the point is that when we started in August 1990, we came from deliveries at a very, very low level and reached deliveries of 1.3 million by February.

General Henry gave a speech to DPSC where he was very generous in mentioning us, along with other companies that are here this morning, about our ability to react. He pointed out we w ırked literally from zero to an average of 775,000 units a month that we were shipping to the military. We did some creative things along here with cooperation of DoD. One thing we did was that we got back many individual injectors that we had sold earlier to the DoD. They brought back 250,000 of each of those two-injectors, and we assembled them in our plant because we simply couldn't get components for new injectors fast enough. We assembled 250,000 in a matter of two weeks, turned that around and sent them back out to Saudi Arabia.

We also bought about three million expired injectors from the military that had a shelf life of five years. Prior to this we had gone to get FDA approval to refit these injectors. We put a new sterile cartridge in the outside of the injector. The lead time on these components is significant. We cut down the lead time dramatically by bringing back expired products which were of no use to the military, taking the parts that we needed, putting in new sterile components and turning them around and shipping to Saudi Arabia. This is something we had never done before. We were able to do that, we were able to negotiate the price very quickly, and it was very positive. So those are the sorts of things we did in order to get up to full production and full shipment by February 1991. Of equal importance though is money. It is your money in the business. This is the sort of thing that can be a major crisis. While everyone feels good in February, someone has to run the business in May. When you have gone back to where you were before, or perhaps below, and that's not an easy thing to do.

Here is what happened to the number of employees. We ramped up with just direct labor employees directly associated with the government. We brought on almost 200 employees by April 1991. By August of 91, we had laid off all but about 50 of those employees. That is not an easy thing to do. It is not putting two tractor parts together. This is making a sterile, injectable that is overseen by the FDA, that can be injected into people and is subject to all the necessary regulations of any sterile injectable product. So it was very, very difficult for us to increase up to that level. When demand fell off, there were some highly skilled people we had to let go.

When all this was over, we made a presentation to General Cusick, who visited our plant. I was telling John Novak, from Raytheon, that they got President Bush, but we did get a General. He came around to our plant and gave a little talk to our employees. I might mention how much this meant to our employees and their working attitude, the company relationship with the DoD. Our employees got extremely excited, and they did this voluntarily, this was a union, we can't make them change a vacation. We can't pay them overtime. There was no overtime. They canceled their vacations. They all asked for Desert Storm/Desert Shield tee shirts. So we bought every employee Desert Storm/Desert Shield tee shirts. We bought them little flags. If you went through our plant — and when the General came through I'm sure he thought that we were all dressed up for him, we cleaned it up for him — but we didn't put up any more flags than we already had. There was a tremendous spirit. The other thing is we had a great deal of media coverage, and I describe it as a kind of Andy Warhol 48 hours instead of 15 minutes. People who never heard of us before, and who don't care about us now, all came to see us. At one time,

three networks were in the lobby and we were feeling quite important as a little company. We gave them access to our employees in the plant, but without any restriction or coaching on the part of the employees. They came up with some wonderful things. I'll never forget, it was actually translated in several languages, a lady, Wanda Moose, who worked in our production line that assembled autoinjectors, said to a reporter, "Every time I make one of these, I feel like I'm saving a life." This is someone who graduated from the 6th grade and is making $10 a hour putting injectors together, but that was the kind of spirit that went on in our company and a lot of that still exists.

I found that the relationship between our company and the DoD improved enormously. I've only been in this business about three years, and I'm used to an atmosphere where you like your customers, your customers like you, and you treat each other with respect, and you have a great deal of trust. And I found out that wasn't always the case. Unlike what Mr. Bonner was talking about two divorce lawyers, we did tend to talk through lawyers and there was, I felt, an aura of distrust. There were post-audits and all those things that go along with contracts. I found it very important, particularly with DPSC. We found ourselves in a position where we needed each other. We wanted to respond. We felt a sense of obligation, as we had media coverage, to say that the DoD was doing an excellent job, which they were, with the work. As the media fished, trying to say our troops weren't really protected, we stressed over and over again how well protected they were. We built good relationships and that's on-going. We made a presentation afterwards to Defense Logistics Agency/Defense Personnel Support Center on lessons learned and we are now in the process of also working with DoD on a process and a program that I think will make sense to both of us.

One of the things you have to ask yourselves is why not just let the plant go dormant. Fortunately, none of our product was used in Desert Storm. Why not just let the plant go dormant, let the business go dormant. If we need some again, we'll buy it. The problem with that is that component time has been extended from 12 to 18 months. There is no trained workforce that can produce a sterile, indictable product. Equipment and facilities deteriorate. And that's an FDA Good Manufacturing Practices problem, where you must keep your facilities up and your people trained. Production start-up can be up to 12 months as it worked out. And there is a tremendous cost for starting up again. So from our view, going to a cold industrial base in Survival Technology and deciding to do something else for a living didn't seem too practical on either side.

We talked about lead times. Our lead times are components because they're small, plastic-molded intricate parts and aluminum metal with up to 10 months, and you simply can't get these parts any faster than that. With our Combo Pen, which is the larger of the two injectors, it actually goes up to 15 months if we started from a cold base. Unacceptable from the military standpoint.

So we've simply learned the following lessons: That prestocking, prestaging of critical components and raw materials are necessary, and we didn't have those. It's less expensive than buying a lot of finished autoinjectors and yet it cuts out that lead time that I just showed you. So one of the things we are discussing is prestocking a lot of components, which will cut down the time it will take to get us up to surge. Stand-by equipment is necessary. There is just so much that we can run through our equipment. And third is to increase automation and that's just our view. Obviously with the type of pricing we had up to this point, we had no incentive to automate, and yet we'd like to. And it's the way I'd rather run our business, and so we're discussing the way of being fairly compensated, but also being allowed to automate so that the workload surge will be much, much higher and it isn't just totally people driven.

The last thing you're asking is how can government and industry work together. One thing I haven't talked about is, could they have waived any regulations, could they have done more, could more have been done than was done? For us the answer is no. We did sign a letter contract, but it was sufficiently definitized and we were quite happy with that. We ran out of money because we needed to buy all the components that we were buying at an explosive level, and payments were accelerated. And the DLA/DPSC said you ought to secure those. I think that was a big help. You can't waive all the regulations with sterile injectable products. It's not tolerable and I don't think you should. There was some conversation during the war about allowing untested products to be used in the military in order to get them there faster. These are sterile indictable products. They should be tested. One of the main things is to maintain an ongoing dialogue, which is what we're doing now. I think both DLA/DPSC have been very responsive. There should be clear, crisp programs on how it can be kept warm, but how it can be kept warm at minimal expense to DoD. Better planning, obviously, and there is a lot conversation going on about that. I've heard Secretary Atwood talk about if you're in a commercial business, the first thing to do is tell all of your suppliers what the forecast is so they know how they can plan. You can tell them long term forecasts so they can plan. But if it's a defense contract, and you do that, somebody goes to jail. So it's very helpful. So we need better input into what is it that our biggest customer is buying for the future. It's already been discussed in

regard to commercial, non-critical specifications. It saves industry time and it saves DoD money. Value Procurement is something a number of groups are working on, but it's really critical.

Another thing, we all know that the Defense Industrial Base is going to be shrinking. It's already shrinking. But rather than let it go into free-fall, what I would prefer to see is concentrated programs to make sure it's not just the survival of the cheapest, but it's really survival of the best. If more attention isn't paid to best value procurement, I'm afraid we're going to end up either with an extremeiy limited industrial base, or we will indeed have just survival of the cheapest. Multi-year contracting and funding are important so that industry can invest. We want to invest in equipment, we want to invest in plants. To do that, we need multi-year commitments. It is very, very difficult for us to deal on a 12-month basis. In our specific case, we're identifying only the markets for autoinjectors in which the government needs help in these specific areas. One is, we're talking to FEMA and a number of other agencies about protection of civilians from the chemical weapon destruction program which I think will be important to the U.S. and in some other applications. Our products are user-friendly. It allows for easy injection. The training program takes about 60 seconds. The only population in the world that is protected is the Israeli population. And no other civilian population is protected.

That leads to the second one — encouragement of FMS sales. Protection to both military and civilian populations. Certainly in Saudi Arabia and Kuwait, perhaps in Lebanon and other countries that are at risk with chemical weapons, the poor man's atom bomb, the troops are extremely well protected. But consider the Kurds: that's what's going to happen to the civilian population. So you encourage cooperation programs for the protection of the civilian population. We think it's a partnership and we have presented it that way. The DoD and other agencies need us, and we certainly need them. We don't think they ought to spend money for things they don't need, but then they don't expect us to stay in business without having it. One of the things we're working on now is a sensible program to keep our base warm, but to recognize that the new defense budget is shrinking.

Question: Was the injector placed in a body...?

Question: But can you get to it effectively?

Mr. Miller: Well, you carry it in a separate package.

Question: You only open it up when you're going to use it? I thought it was in place when you needed it.

Mr. Miller: No, it was designed so that you do it through your clothes, because you don't have time to disrobe. It's very quick, it's a matter of 60 seconds ... otherwise you get a severe infection, but nothing else.

Question: Are you considered a small business? ... government? ... Are you a large business?

Mr. Miller: No, we're a small business. Not deliberately, but we are.

Question: When you said you could accelerate payments, that was part of being a small business?

Mr. Miller: Actually it wasn't . It may have been, but I don't even understand the legality of it. It's just that we were talking to the contracting officer and they made an attempt to find the money, to look around and find it, and we went up to get it. So that's what we did. It was really cooperation on their part, not any particular action on our part.

Question: Did you have any delays in getting your output as we experienced in the gloves?

Miller: No, it wasn't really. I'll tell you what we did, and we started that and we stopped it. There was still some understandable confusion on how many did we need and where did we need them. There is a 30-day sterility test you go through with these

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Question: Did you do anything to reduce vulnerability problems in regard to components?

Mr. Miller: Not really. I guess in a sense there could be. We buy some of our chemicals from Europe, but the chemicals are really inexpensive. We keep 10 million doses of atropine in the plant and that's the reason. And for the second chemical, praladoxim chloride, we buy that from the U.S. So we try to avoid foreign dependence.

Mr. Altizer: The Joint Surveillance Target Attack Radar System is probably best known by its acronym JSTARS. JSTARS is a joint Army-Air Force program that provides real time, wide-area surveillance of the battlefield and rear echelons. JSTARS tracks enemy armor, vehicles and troops over a wide area. It also provides precise, real-time targeting information to direct attack aircraft, friendly artillery and stand-off missile batteries. Grumman is the prime contractor for this system and is responsible also for integrating the activities of several major subcontractors. We have with us today Jon Campbell, Grumman's Desert Shield/Desert Storm Program Manager. In that capacity he prepared contractor personnel to deploy and ensure that USCENTCOM's taskings were met. In February 1991, he went to Saudi Arabia and served as the Grumman team leader in the 4411th's JSTARS Squadron. After Desert Storm's successful conclusion, Mr. Campbell directed logistics activities in Saudi Arabia and remained in-country to oversee

the redeployment of the aircraft, personnel, and all support equipment. So I'm happy to introduce our last industry speaker, Jon Campbell, who has obviously had a very fascinating year.

Mr. Jon Campbell: Since this is such a diverse group of people here, from different backgrounds, I want to use this cartoon to talk a little bit about the JSTARS program. You've heard a little bit about it. What we're talking about as far as the operation goes, as you can see, is a militarized 707 aircraft built by The Boeing Company. When it becomes militarized, it changes from a 707 to a configuration the Air Force has designated an E-8. We have right now two E-8 airplanes. The jointness here comes from the fact that it's an Air Force and an Army program and the unique thing, the heart of the Joint Stars program, is this — it's not a canoe here. It is a 20-foot long radar on the underbelly of the airplane. This is a side-looking airborne radar, multi-mode, that detects movements on the ground. It has a moving target indicator mode as well as Synthetic Aperture radar mode, an SAR mode, that in effect takes pictures of targets on the ground such as SCUDs, etc. People can look at them and say, that's a SCUD.

The flight crew of the airplane is a standard-type operation with a pilot, co-pilot, navigator, and a flight engineer. And, in the aft of the airplane, we have a number of radar consoles, radar scopes back there. They're manned by Air Force and Army people. Some contractor people were on board during the Desert Storm combat missions — normally four contractors flew. When you go from the commercial airliner to the militarized version, you put some radar scopes back there, a lot of prime mission equipment, a radar sensor, some data links. Then we're able to go out there and ...this is a pictorial of the side-looking radar that goes down to the ground and picks up all the targets on the ground from a position a little bit short of the forward line of our own troops to well rear within the area that the corps commander is usually interested in. Notionally this is usually about 200 kms deep, so you fly at some distance away from the front lines for your own safety. The things it does, these are fancy words for finding SCUDs, etc., and finding convoys, and things like that. The other thing, the point I want to make about the JSTARS program is, it was a Full Scale Development [FSD] program. We have the last of the big money-type firm fixed-price contracts. It was awarded in 1985, about $575 million for this particular contract to develop two of these E-8A airplanes. We are about to complete the FSD contract in December of this year [1992] and get authorization for a low rate initial production. That's the stage that we're in. When we started doing this Desert

Storm/Desert Shield activity a little more than a year ago, we were two years from ending the test program and quite a way away from beginning the production program. So that's one of the things that sets the tone. We were not a production system at all, a point which will come into play in the rest of the pitch here.

This is a photograph of the airplane on the ramp at Riyadh. The background is there, the Patriots were over here somewhere, they were real good guys for us. General Horner, the air commander, had some good words to say. This is what we looked like coming down the runway with the crew on board at Riyadh. This next slide is just preparation activity. How we went from an R&D type program to becoming a combat asset. Like everybody else we got a call, ours was a little later than most of these other gentlemen talked about this morning. Our notification, I remember, was a Friday night and I was walking out of the plant at five o'clock and wound up turning around and getting out of there at midnight that night. And like everyone else we worked through weekends and the holidays to do this stuff. We were having to deploy the two jets, and training Air Force and Army operators to operate the equipment. We also had to send spares and support equipment as part of the contract.

Our contract was a phased activity. The Desert Storm contract that we did was not an adjunct to the firm fixed-price FSD contract. We had a separate Desert Storm contract that was a cost plus, and we were happier with that. One of the things we had to do we did because these planes were both test-configured. As you're going through the test program, you change configurations of these a lot. And this means something to us, but probably doesn't mean anything to anyone in the audience here, but what we're trying to say here is that we have two airplanes that we do a lot of different testing on. To deploy them over there so the operators can move from one to the other quickly, we had to make them identical and it was quite an effort to do that. We had to come up with a baseline performance to make sure the system worked well enough, consistently enough, to begin with. We were an FSD-type program and we hadn't even been through initial operational test and evaluation, in which the Air Force and Army test agency people come in and Quality Control everything on you. So we were having to do that. We had to train the flight crews. We had to get in-flight refueling-qualified. We had to get gas from KC-10s. This is something that for an FSD program you don't have to worry about. But when you have to go over there and fly missions at some distance from Riyadh, you refuel during these missions and we air refueled every night over there.

And then it turned out there were a number of other things that came up that the airplane did not have in the FSD version that we had to have, or that the government decided we should have when we deployed over there. One was a little bit more UHF radio capability. We wanted to be able to do some radar things a little bit better, and some data link things better. Have-Quick is an anti-jam-type radio able to talk to the fighters we were directing in on targets. We wanted to have an air picture from the AWACs. This is an acronym for a JTIDS information distribution system. We performed some other miscellaneous tasks, expanding head set capabilities and things like that. What we did in this pre-deployment period from December 17, 1990 to 9 January 1991 when we finally stood down was that we flew — between the two airplanes — 19 flights and this worked out to be about a 23-day period. We flew the two airplanes a total of 19 times to do these sorts of things. Average flight hours for these missions was a little less than five hours and this was for us at the time an unprecedented tempo of operations. In our pre-crisis test program, we were typically flying one airplane twice a week. That's about the normal by the time you go up and you fly and run your test and come back to the lab and analyze, etc., and you go out and try to improve or move on to the next phase. So this was a big change..

Mr. Miller said they canceled their August shut down period. We shut down usually over Christmas, but we didn't do that this particular year. So we did what we were supposed to do and we wound up deploying on January 11, in a little bit less than 30 days. We were ready to go in 23 days, and the two airplanes with all of our equipment marshaled, and all the necessary personnel left that January 11. We left Melbourne on the 11th and got to Riyadh on the 12th and we started flying 48 hours after arriving. We had a little crew rest problem and had to adjust body-clock things. So we started flying January 14. Then, as everyone is aware, Desert Storm started. It depends on whether you're saying the 17th of January in Saudi, or the 16th in the U.S., when everyone is watching CNN. We flew one airplane each day, long missions, they averaged about ten and a half hours. Bad guys move around a lot and try to do replenishment at night, and they were launching the SCUDs at night. So we were flying, launching anywhere from about four in the afternoon to six in the afternoon in Saudi, and probably landing between four and six in the morning.

As far as the unclassified system performance here, it did better than anybody thought. Our moving target indicator performance worked out real well. This was the type of thing that picked up the movers on the ground. The synthetic aperture radar capability at very long range was a big aid in targeting for the Air Force. We did well with the F-15E

Eagles and with passing targets to the Army. I guess the key thing about the SAR was to be able to identify SCUDs for targeting. This is a map of Kuwait City and this is one of the actual scope presentations on board the aft of the airplane. The mother of all retreats — and you can kind of see where the roads were — trying to get out of Dodge. It shows what we could do here.

The contractor personnel that we deployed, people are always a little curious about that. We had 41 Grumman employees and several subcontractors. Norden makes the radar, and we had some technicians available for that. Our air maintenance was done by another subcontractor called Greenwich, out of Miami. Cubic are the data link folks and we also had a couple of them go out into the field with the Army GSM. The ground portion of this — and I'll have a picture of a truck going out there in a minute — they deployed five GSMs to the theater. The thing with the contractor personnel is we had about 65 in-country. We identified some other people in case someone broke his leg or whatever and you had to substitute. Also we didn't know exactly what the mix of skills was going to be and we were also confronted with a ceiling for the amount of people that you wanted to put into the country. The military did form this 4411th Joint Stars Squadron and the contractor personnel constituted about half of that. There were about 60 to 65 Army and Air Force people in this unit. The commander was Colonel George Muellner, a Brigadier General today, and he ran the squadron over there in Riyadh.

These are some stats that we're kind of proud of for a test system. The availability rate was determined by logisticians with the formulas to calculate this. The asterisk is down here because we had to do an engine change on the ramp at Riyadh. This acronym means quick engine change and again, for a full scale development airplane, the military does not go out and buy quick engine change [QEC] kits. We lost an engine because of foreign object damage [FOD]. There was a lot of stuff on the ramp at Riyadh and we had a FOD problem there. If this sort of thing happened to an AWACs jet or the Rivet Joint Aircraft which were right next to us there, they could change an engine in something less than six hours because they have these QEC kits. We didn't have that luxury and I was scared to death when they told us it was going to take 72 hours to swap that out. That was one thing that kind of hurt our maintenance numbers.

However, we do feel that we proved that the 707 is very capable. We hit all the scheduled sorties, etc., and good, long missions were flown up there with this availability rate. This rivals the mature weapons system like the AWACs. When we closed out over there we had flown 49 combat missions in a row with a total of 54 flights, because we did

a couple of functional check flights in there. We also did a hot refueling on the ramp at Riyadh, which is an unusual thing you can do in combat. This is the Army ground station module. You can see it's essentially an S-280-type shelter here with an hydraulically raised masthead and this is a UHF antenna that they have on it. This is what we downlink to and the Army General is quoted as saying what we were doing for him.

Now to back off from Desert Storm a little bit into how is it that we were able to go over there and do this. I think there are two key elements. We had deployed the system overseas twice previously. One was called Early Look. We went to the UK for a little less than a couple of weeks. We took only one airplane on that exercise and we had about 40 contractors. I didn't put down the number of the military personnel, but there were about 60 Air Force and Army on that, and we conducted four flights. This was in February of 1990. The focus of this exercise was to test the radar in its intended operational environment in the European theater. What we did was to fly out of the UK over Germany and look around over there. So we did that in a very short period of time and we learned an awful lot about personnel processing. We also learned a lot about operating out of different airbases and what kind of equipment we needed, etc. We also conducted, in the Fall of 1990, what was called an operational field demonstration when we operated from a number of different bases. We started off in the UK and we supported a number of Army exercises in Germany. From there, we went to the NATO AWACs base at Geilenkirchen, Germany, and to the CINCUSAFE at Ramstein. This is Paris here. The French have a test base right outside Paris and we took one airplane over there. We were over there six weeks on this European tour, flying a total of 16 flights. On the days we didn't fly we typically did ground demonstrations for a lot of these general officers, and this was in the fall of the year. So what happened was, this was kind of crawl, walk, run, if you will, in terms of being able to support the airplane, operate it from different bases with different levels of equipment available at bases. And we learned an awful lot about something the Air Force called mobility. This was just a shot of the airplane taking off from Mildenhall.

Let me touch on these questions. The version I got called discussion topic one "Difficulties that we may have encountered because of laws and regulations." There were really no biggies. I think as everyone else has said, we operated within the rules and when it's all said and done, I guess the rules work. There certainly were no major problems. We had to contend with the rules in different areas. Things that were irritants, I suppose — we are located at the regional airport in a place called Melbourne, Florida, where our facility is, so you have their typical restrictions. They don't like you doing nighttime engine runs because it's noisy. If it gets to be after 9 or 10 o'clock at night you have a

problem with that. You can't fly sometimes when it rains in Florida in the December, January time frame. On New Year's Eve, you have to be on the ground — like every other night — by midnight. And we did have to fly one of those test sorties on New Year's Eve.

The FAR regulations — somebody already talked about that a little bit. What could be done would be to shift to commercial contract terms. There's costs to that. So that's a tradeoff that I think has to be considered. It's something that you might want to consider and it kind of depends on the situation at the time, I think. Other folks have talked about the DO and DX ratings. We were in the DO type area. We felt we wanted to go to DX and for some of our suppliers as well, but then we would have been in the same situation that other people talked about, that it would have been more of a burden on our vendors as to which box are they going to work on next in managing their priorities. We didn't have to make it an issue mainly because of the shortness of the war. We were able to manage this ourselves.

There was only one time that we really leaned fairly hard on a supplier to get us a little bit more priority for this. The rest of the time things worked out pretty well. We had to go through the same rules as everybody else. You don't go overseas without passports, or military temporary duty [TDY] orders. All these 40 to 65 civilians, wherever they worked, had to learn to use and run all this wonderful gear that we've seen demonstrated to us this morning. They didn't know how to put a gas mask on real quick. They didn't know how to shoot up with atropine and put on chemical gloves and the rest of the chem suits. So in the 23 days to go, we were teaching people some things. These people ranged from a couple of vice presidents who deployed with us all the way down to aircraft mechanics. And we were all in there going through all this stuff, same as the military. That was the rule for the whole deployment. We wore the DS suits over there. We didn't have any of those boots, they didn't get over there quick enough, those Desert Boots. We were a little looser on our uniform rules anyway.

The contract stuff has been kind of touched on. I'm not sure I can add too much to it. We went with the cost plus. I think what happens here is that when you have a good relationship and you know this is coming, you can anticipate. Yes, you take some risks and you do some things because if you wait until everything is absolutely signed, you're not going to be able to get there from here. We were talking about operating without a contract. You have to be able to anticipate, and you can't wait until you get the PCO signed on the dotted line. In our instance, we had kind of a vague authorization for the pre-deployment phase, and that came in — it was a five o'clock Friday routine. The

deployment contract that said go didn't happen until the day before we went. So they're being very careful with their authorizations for work and following the rules.

And of course we had to impact on our subcontractors. We had been alerting them that this is happening and we're going to need your assets because what we were doing here with only two airplanes, we were scarfing up every piece of prime mission equipment that was available to operate the electronics in the back of the airplane. So we were leaning on them pretty hard and we set up 24-hour notifications to them and things like that. But you have to anticipate the call. We had known it was going to be coming. We had known it was coming, we expected it. And also we learned a lot about how to get our people ready to be able to deploy. Also how to deploy the system.

The mission crew for these airplanes is about 20 people, the flight crew and the people who work the consoles in back and the technicians watching the boxes and the digital buses and that kind of stuff. But when we go overseas with these, we take a grand total of 43 people on board each airplane. So we deployed organically a pretty good amount and we wound up sending over to the theater another 20 or 25, by C-5s, into that particular theater. The other thing we do is from these two previous deployments we learned which were the most critical spares that we had and we cabin-packed as many of them as we could so when we landed at Riyadh, we had a lot of our own organic capability there and the C-5 equipment for some other stuff as well. Some of the Army trucks and ground station modules didn't come in until a couple days later. But we had enough gear to be able to get out there and start operating immediately. So we had learned significantly from these two previous deployments.

As for government help with waivers and priorities, I guess everyone else has kind of said that team efforts mattered. We made a little bit of a team Joint Stars. I guess the biggest thing we did from back in the States was that we established a command post in the CONUS down at Melbourne. And this command post that we set up there was part of the contract too. The purpose was to support the deployed squadron. We had a number of people and it was 24-hour manned, we're dealing with an 11- or 12-hour time difference to Saudi. We had about 13 folks in there full time. There were Air Force people in there, as well as contractor personnel, and one of the things we did because of deploying civilians overseas was we had a hot line for our families there. It worked out pretty well for morale purposes, etc. We also put three people at Charleston and Dover. And we had a lot of equipment. The biggest thing we did was to maintain a consistent communication with the

folks in Riyadh through telephones and faxes. This was critical for us to be able to support the resupply effort.

This is what the command post looked like. You can see we had charts here and we tracked everything. We watched CNN, we compared notes with the folks in Riyadh. And compared their coverage to our coverage. They had a TV for a short period of time. We had some visitors: this was where our Program Executive Officer, General McElroy, came in. This is a fellow who got a thank you note from General McPeak who runs the Air Force. The flow of our resupply operation was critical because our situation was a Full Scale Development [FSD] and limited asset-type situation. The people in Saudi would talk to us about what parts they needed and we'd put somebody on it and tracked the status. The immediate thing we got is this aura of cooperation that you just can't stress enough. The shipment requires that you send a part from home in the U.S. to Saudi. In-country we did this sort of thing, but we used commercial carriers.

On Super Bowl Sunday we used the corporate jet and ran some parts around and stuff like that, but to ship the stuff overseas — you just couldn't get into Saudi commercial — you had to go through the military and the system worked pretty well. The Air Force folks coordinated with the ACA at Wright-Pat and got us the authorization. And we coordinated the shipment either to Charleston or Dover Air Force Bases and then we let them know it was coming. From Charleston, the home of the Desert Express, they had daily flights going into Riyadh. And when we started the conflict, all of our shipments were designated so we could use Desert Express. Later on the rules changed and we could only ship aircraft on ground [AOG] grounding-type parts or other mission-criteria parts through Desert Express. Then we got into using Dover Air Base. They had daily flights out of there. That was what the promise was, but it really didn't turn out to be quite that frequent. We got most things out of there between two and four days. That was about the time period we had. That's why we had to use the two different bases for our resupply. And the resupply times were critical because we didn't have that many assets. You had two airplanes with about 3-1/2 shipsets of assets in the entire free world. So, depending on the part, we really micromanaged individual parts. We just didn't have a depot that we could go to as you would with a mature weapon system. So we were really tracking these things very, very close.

So in the discussion topic we want to talk about, yes, the Air Force and the command post guys needed shipping authorizations which were really, really essential. The people at Charleston and Dover worked with us. We put some expediters, some of

our materiel management people, at these bases on a temporary basis and they were able to work with the people at Charleston and Dover. We had to break into a shipment that was scheduled to go out of Dover and break it out of there because the part had become critical while it was waiting to routinely fly out from Dover. And it was that kind of situation. You can only send stuff, critical parts and materiel, so if it wasn't critical you went to Delaware. But while waiting at Dover the equipment became broken at Riyadh and this part was critical. The government helped us a little bit with some parts that came in from foreign places. A company in Canada called Garrett makes an air cycle machine that we needed for the airplane. We had some Army assets for the ground station module in the UK that had to be shipped back and then sent overseas, and we got some help from the entry port of call. It looks like a minor thing, but on the ramp at Riyadh when stuff came in over there, it was helped immensely. We used about a 6 x 6 blue sticker with some stars on it and this would tell you that it was Joint Stars stuff. It also helped our expediters at the other two bases to be able to identify our own equipment and get the stuff on the airplanes as quickly as possible. You weren't standing around waiting for some clerk to bring it to you. You were out there looking and trying to get this stuff and being just as aggressive as possible. We had to have passports and the visa stamped from the Saudi people there to let you into the country, we got some help on that one also.

As for surges in the future, this is something that we are concerned about at Grumman. We anticipate that there could be, if there are any future contingencies. I think folks will say, oh, Joint Stars, you'll probably have to do this again since you did it once. We're going to be in the same situation with just these two E-8 airplanes and the same amount of spares and equipment, until the system reaches IOC, and that's somewhere around five or six years from now. So the assets that we have are not going to change in terms of hardware. What will change, and make it easier I think, is that the military is developing a joint concept of OPS. And there will be more trained military personnel available to operate the system as it continues to mature. We have a joint test force there at Melbourne. So those two areas are where I think we'll see some improvement.

There probably has to be some contractor logistic support and then that will flow down to subcontractor support that we'll have to come up with. What it will come down to is for this type of thing to happen there's going to have to be some government cooperation to want to be able to do this in the future. The government could help to achieve a max capacity through the DX ratings. I think if we had a more prolonged conflict, we would probably want to see some changes there. You can do a lot with incentives and just by having necessary equipment. In our instance of a lot of sophisticated electronics surging

up to capacity, as the man from Raytheon (Mr. Novak) said, you just don't do this overnight or in a month or two months. I think it's more as you are addressing them in the seminars here — six month-, 12 month-, 24 month-type programs that you're looking at when you'd really be able to do something. We did well with the reliability and availability of our limited assets. We met the tasking, we flew the missions we were supposed to fly. We got a number of awards afterwards. The Air Force Association presented the Joint Stars team with the Theodore von Karman Award in September 1991 The Flight Test Engineers Society gave us the Kelly Johnson Award, and *Popular Science* came up with this award, also.

Question: What is JSTARS IOC, how many airplanes?

Mr. Campbell: IOC is five airplanes.

Question: Are they 707s or 767s?

Mr. Campbell: All 707s.

Mr. Thomason: The meeting has been very interesting, there's a lot of food for thought. A lot of good information presented. Hopefully we will be able to capture this in hard copy by way of a transcript which we will circulate to the speakers. And I'd like to ask each of the speakers if they could provide us hard copy, we would appreciate it. Fred Breaux will take charge of collecting that material from you.

This has been an experiment, an initiative. This was industry heard from through a half dozen representative firms. The speakers I think have done an outstanding job in presenting their recommendations and I hope you will join me in thanking them. Our hope for this seminar series is in the next step to take up these recommendations, the experience, the observations that were represented by these industrialists, and work informally in an interdepartmental mode to try to develop some feasibility assessments and some implementation steps. What can be done, how realistic are these? Are you way off the mark? Is there some reasonable amplification? Those kinds of things will hopefully happen between the first and second seminar, at which point if the speakers can manage to

arrange it, we would very much like to invite you back to hear responses in more detail from interdepartmental representatives. We'll be working that out in the coming weeks.

But in general I would like to say thank you very much and we look forward to seeing more of you. We have a buffet lunch that you are welcome to participate in. I would like to ask Mr. Muckerman, our sponsor from DoD, to say some closing words. Then for FEMA, Mr. Jim Miskel, who is standing in for Mr. Joe Moreland, to say a final closing word. Thank you very much.

Mr. Muckerman: I'll be very rapid because I know you're all hungry. Thank you. I've been to a lot of these things but I've never seen six speakers in a row follow directions more perfectly than you. They say of Desert Storm — it was the perfect war. God willing, we won't have another one, but if we do it probably will not be perfect. We have to live by our wits. This is an interactive process. The ball is in our court. Thank you.

Mr. Miskel (FEMA): Let me just reiterate what everyone else has said. All the speakers were terrific and I'm sure I'm speaking for everyone in government. We're very excited at FEMA about this series of seminars and I certainly think we are off to a big first step today. So thank you everybody, and in particular I thank Jim Thomason for his work and IDA. Thank you.

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13. ABSTRACT ***(Maximum 200 words)***

This seminar examined the role of industry in supporting the Desert Shield/Desert Storm Operation, and identified some of the lessons learned from that experience. This was the first of a series of 8 resource preparedness seminars co-sponsored by FEMA, DoD, and IDA in 1992-93. It set the stage for the remainder of the seminars, which considered what preparedness plans, policies, or programs are appropriate to address industrial preparedness issues in the future global environment. Presentations on the industrial support aspects of Desert Storm were provided by top executives from six firms involved in supporting the fighting forces in the Persian Gulf. These firms represent a range of personnel-support items produced in large quantity for the Gulf War (boots, meals, nerve gas antidote injectors, chemical warfare gloves) and two hardware items that proved critical in the conflict (Patriot missile, JSTARS).

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