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THE EASE (E'S) OF IMPLEMENTATION OF THE SAFETY PROGRAM  
AT THE MARSHALL SPACE FLIGHT CENTER \*

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I would like to entitle my talk to you at this time "The Ease (E's) of Implementation of the Safety Program at the Marshall Space Flight Center;" and lest anyone should question if any safety program comes easy, let me hasten to switch to the other meaning of this title, because we will also be talking about at least fifteen important elements of our safety program - most of which begin with the letter "E"; and let me call attention to the fact that the word "elements" also starts with "e", so the letter "e" must occupy an important place in any accident prevention program.

Before we discard entirely the Ease of Implementation of the safety program at the Marshall Space Flight Center idea, let's dwell on that point for a short time. Most of you in this room quite probably have many years of experience in accident prevention work and would be quick to admit that some safety programs in your experience have been easier to manage than others and one of the most important reasons for this was executive interest. If the top man has been behind your safety program, the remainder of the executives and supervisors and finally the employees, fall right in line - and who would say this does not make the job easier? Mr. McCauley has talked about the executive interest at the top in NASA. This interest filters right down to us at the grass roots level. I like to think of the work at the Marshall Space Flight Center as being one great, big safety problem and in its simplest form, it could be summed up like this. We have the know how, the propellants, the hardware, and have already had some experience in space travel - the big problem remaining is how to put the man on the moon safely; and get him back safely. So I like to think of our safety program as one in which several thousand engineers and scientists are actively engaged. All we must do in our little safety organization of eight people, therefore, is to tie a few loose ends together and see that the proper emphasis is placed on these 15 or more elements - the most important of which, without a doubt, is executive interest. And fortunately, at Marshall we have that interest from Dr. von Braun, our Director, and all of his top assistants, which truly does make implementation of the program easier.

The Marshall Space Flight Center is working hard to get to the moon. Few industrial establishments in the country have this as their primary mission. We are actually engaged in building the vehicle that someday, within this decade we hope, will transport the first astronauts to the moon. Our vehicle is named the Saturn V, and at Marshall we are presently assembling the first stage of this vehicle which will be powered by five F-1 engines built by the Rocketdyne Division of North American Aviation. These five engines working together will produce a thrust of 7,500,000 lbs., utilizing liquid oxygen at minus 297°F and RP-1, a high grade of kerosene. Other stages of this vehicle are being developed and built by the S&ID Division of

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North American Aviation and the Douglas Aircraft Corporation at various locations across the country. These upper stages utilize liquid hydrogen at minus 423°F as the fuel and liquid oxygen as the oxidizer. A large portion of this work is being done at our Michoud plant at New Orleans and a huge new site for test firing is now under construction in south Mississippi. All of this work is tied together and supervised by the Marshall Space Flight Center, which presently is staffed with about 7500 civil service personnel and 3700 in-house support contractor personnel.

All of this represents a great big effort and this is considered next in importance in our "E's" of accident prevention. Our program deserves our best effort not only from the top executives but all the way down to each individual employee. We don't always get the best effort from everyone because actually our problems are little different from yours; but our job in the Safety organization is to give the best effort we can and encourage the same from everyone. How this is accomplished will be seen as we look at each of the following elements of our program.

A very important attitude in our effort to implement the safety program at Marshall is one of earnestness or sincerity. We feel that attitudes are contagious and that if we want our people to be truly interested in the safety program they must see that we are dead serious about it and are sincere in our every effort to prevent accidental injury and damage to property. Many times on government operations it may become difficult to sell a program on the basis of costs or loss in production, and this is true in our case, but who needs a better reason than to sell solely on the basis of sincere appreciation for human life and for the prevention of suffering and inconvenience imposed on families due to unnecessary accidents and fires? So we think a key attitude in the implementation of the MSFC safety program is one of earnestness and sincerity.

Another "E" stressed in our program is excellence. We try simply in everything we do to go first class, whether it's in the preparation of handouts, training material, engineering design reviews or whatever arises. A very large percentage of our people are highly educated and technically trained and have no patience with slipshod methods and poorly prepared material or techniques. So in order to gain and keep the respect and cooperation of those with whom we work, we strive for excellence in every facet of our program.

Here is an E you are all familiar with - Engineering. Naturally one of the most important parts of our job is working right along side our facilities and project engineers in the planning of our facilities and test programs. We have in our safety organization three engineers, one of which has specialized in industrial hygiene and health physics and another in sanitary engineering with a Master's Degree from Harvard. On all important facilities, an engineer is assigned to the project from the criteria planning stage and hopefully stays with it through all design reviews and acceptance

inspections. This man will review all drawings, prepare comments and participate in most design review meetings depending on workload. Another area in which we offer safety engineering service is in the planning of test set-ups, including protection from propellants, cryogenics, explosives, or other hazardous materials; calculating overpressures and thickness of protective shields. Another service performed is in making surveys of facilities and operations both from the safety and fire protection engineering standpoints and the preparation of pertinent recommendations. Because of the unusual nature of our mission, we have some rather unusual facilities and I would like to take just a moment of your time now to show some slides which should better than words describe some of our interesting activities:

### SLIDES

Another "E" with which you are thoroughly familiar is education and training. And though we spend little time talking about it here is no indication of our concern for its importance. Every new employee receives a safety orientation or indoctrination because we feel it is so important that our new employees get off on the right foot, safety wise. This consists of a 15-minute lecture in which it is explained that safety comes first but that we must be slow to say that a job cannot be done because hazardous materials or processes are involved - the important thing is to find the safe way; the lecture period is followed by a short film which illustrates this point. Another method for educating our people has been the publishing of carefully selected material as "five-minute safety talks" which can be simply read to employees or discussed in safety meetings. Yes, we have safety meetings - throughout most of the organization, both committee meetings and meetings for all employees. We like formal classroom training, too, and we have several courses that run intermittently as the need arises. These include our portion of a Supervisory Development Course, American Red Cross First Aid standard and advanced courses, and a Driver Training Course. Many other techniques are used, including the use of our official Weekly Bulletin, our plant organ, the MARSHALL STAR, handouts, etc. In this respect we believe in distributing an ample number of copies of handout material because paper is cheap and if the message doesn't get to the people the cause is lost. In this connection, we feel that our objective must be to create the proper mental attitude in addition to simply educate and train. No matter how well educated and trained our people may be from a technical standpoint, if they do not have the motivation to plan and work safely, we've accomplished little. In other words, we feel that working, driving and playing safely is a way of life that must be created through the molding of correct mental attitudes. We therefore feel that our safety program must be both enjoyable and entertaining to our people in order to gain their best cooperation. We have not done all we would like to do along these lines, but we have promoted a spirit of competition between our laboratories; contests; interest in accumulating consecutive days without lost time injury, and the like. In addition to making the program enjoyable and

entertaining, we think there should be encouragement or incentive. Someone always asks the question why reward someone for working safely when that's what they should be doing anyway. We feel if that is what it takes, it is well worth the effort and we don't necessarily mean that employees should have heaped upon them valuable gifts. Encouragement in whatever form it may come is very important. At Marshall we seek opportunities to favorably recognize our people for good, safe job performance; we publicize Wise Owl, Golden Shoe and Turtle Club members and will do the same for Kangaroo Club candidates when we have them. We write to those individuals who have served as chairmen of various safety committees to give them a pat on the back and thank them for a job well done. We feel that recognition for employee groups who work for extended periods without lost time injury, if nothing more than a memo from their higher-up supervisor pays many dividends and provides the incentive to continue doing a good safe job.

Another of the original big "E's" and just as important as ever is enforcement. A safety program falls flat on its face without enforcement of the rules; and in this connection the key man is the supervisor. At Marshall we place the responsibility for safety squarely on the supervisor where it belongs and he's expected to enforce the rules. Safety Office representatives conduct periodic inspections and prepare written reports of discrepancies found to the director of each of our laboratories but this is necessarily on a spot check basis. It is impossible to cover our entire area with the two or three men we have available for such work, so the real burden must fall on the supervisors and we continually remind them of this. Enforcement may not be the problem now that it was in years gone by but it is just as important as ever. Our progress along these lines can be attributed to many years of indoctrination and training our people have received from industry and from the U. S. Army, of which the Marshall Space Flight Center was a part until taken over by NASA in 1960.

Another "E" we've found important at Marshall is experience. Sure, you say experience is important anywhere but we say in our field of research and development it is extra important from the safety standpoint. A little experience and knowledge goes a long way and sometimes may save a lot of money and time. No doubt much money has been spent unnecessarily to provide for anticipated hazards which may not have existed, at least to the extent thought in the planning stage, and of course, the converse is true. Safety engineers should certainly be concerned with the conservation of funds in planning of facilities - but of course never to the extent of compromising safety. This is where experience comes in. We have attempted to find someone with experience in working with each new product or material. There are few things really new - someone has worked with it and knows the problems if we only take the trouble to find this experience.

Another "E" we like to use at Marshall in the implementation of our program is, contrasted to experience, the experimental. We think a lot is to be gained by trying new things, especially if a lot of cost and effort is not involved. We in the accident prevention business have barely scratched the surface on things that we can do to prevent accidents. Our profession is only about half a century old and the field is still a great challenge. We are certainly advancing; new products are available each year; new ideas are slowly but surely coming about, but there's no limit to what can be done. We like the novel approach Mr. Gidel of the Department of Labor takes in his writings, many of which you have read in various publications and we should appreciate a man of his ability. At Marshall we aren't rich with idea men but we do come up with something occasionally and more importantly we realize the value of the experimental techniques in implementing our safety program. Let's at least try new approaches!

We must briefly mention investigation of accidents. At Marshall we realize the importance of investigating each accident and even on our minor injury report there is space for the supervisor to fill in what happened and why. On more serious accidents, the supervisor is expected to indicate on our report form what has been done and what remains to be done to prevent a recurrence. And on the major accidents resulting in one or more critical injuries, fatality or property damage in excess of \$5,000, an official investigating board is appointed.

In conclusion, let's talk about enthusiasm. Fortunately for us at the Marshall Space Flight Center we are engaged in a mission for which enthusiasm comes almost spontaneously. Our's has been a dynamic, growing, extremely interesting organization and enthusiasm just seems to spill over into our safety program. As mentioned earlier we like to think of the entire project as being just one big safety problem. Admittedly we have our problems getting some of our engineers and scientists enthusiastic about some of our "down to earth" problems but that's to be expected. The safety of the astronauts is uppermost in everyone's mind and incidentally we have a program called Manned Spaceflight Awareness, the purpose of which is to promote awareness of the importance of quality planning and workmanship. Another group that has been of great help, especially in the area of design to provide easy maintenance and servicing of the vehicle is our Human Factors Engineering Section with which we cooperate and work together. Tying it all together, no element has been more important in the effective implementation of the NASA safety program at Marshall than enthusiasm on the part of our employees. Another word for it is morale and who would say that good morale does not go a big way toward assuring an effective program.

Summing it up, our program has been implemented through these elements: executive interest, effort, earnestness, excellence, engineering, education, entertainment, enjoyment, indoctrination, enforcement, investigation, encouragement, experience, experimental and, last but for from least, enthusiasm. If not essential, these E's will assist greatly in the Ease of Implementation of any program. We recommend them.