STRATEGY RESEARCH PROJECT

ISO 9000 - A TOOL FOR THE
U.S. ARMY CORPS OF ENGINEERS

BY

LIEUTENANT COLONEL JAMES S. WELLER
United States Army

19970623 042

USAWC CLASS OF 1997

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

USAWC STRATEGY RESEARCH PROJECT

The views expressed in this paper are those of
the author and do not necessarily reflect the
views of the Department of Defense or any of its
agencies. This document may not be released for
open publication until it has been cleared by the
appropriate military service or government
agency.

**ISO 9000 - A Tool for the
U.S. Army Corps of Engineers**

by

Lieutenant Colonel James S. Weller
United States Army

COL Herbert F. Harback
Project Advisor

U.S. Army War College
Carlisle Barracks, Pennsylvania 17013

ABSTRACT

AUTHOR: James S. Weller (LTC), USA

TITLE: ISO 9000 - A Tool for the U.S. Army Corps of
        Engineers

FORMAT: Strategy Research Project

DATE: 24 March 97 PAGES: 39 CLASSIFICATION: UNCLASSIFIED

In order for the U.S. Army Corps of Engineers (USACE)
to remain competitive in its role as the nations engineer,
it must scrub its processes, eliminate redundancies and
improve its methods of producing consistent products across
the organization. Quality improvement programs such as
Total Quality Management (TQM) and the Army Performance
Improvement Criteria (APIC) are steps in the right direction
but they leave out the key first step of establishing and
documenting the organizations baseline procedures. ISO 9000
is a tool that can fill this gap. This paper will review
where USACE is today and how ISO 9000 can fit into the
organizational structure to provide the needed baseline to
ensure the delivery of quality products and satisfied
customers for the future.

TABLE OF CONTENTS

INTRODUCTION

The U.S. Army Corps of Engineers (USACE) is a resource to the nation, it serves both the construction needs of the Army and the Air Force as well as civilian sector needs for a broad range of engineering functions. In order for USACE to remain competitive in its role as the nation's engineer, it must scrub its processes, eliminate redundancies and improve its methods of producing consistent products across the organization. ISO 9000 is a tool that can assist USACE in this effort. The International Organization for Standards in Europe originated ISO 9000 as a set of standards which documents and controls the production process. Originally developed to cover the manufacturing process they support the service industry as well. Certification under ISO 9000 involves compliance with procedural standards, documentation of internal processes, and verification by an outside audit agency. The real question an organization must address is whether this process will provide any benefit. Private industry must focus on the bottom line - will this improve our competitive advantage and therefore improve profits? For government agencies there is less of a focus on profits and more of an emphasis on providing quality service to the customer within

the allocated budget. ISO 9000 is improving the performance of private industry and it can do the same for USACE.

BACKGROUND

Business has traditionally been focused on finding faster and cheaper ways of producing products. Quality was often a secondary issue to quantity. Using an assembly line as a model, instead of building in quality at each step in the process the final inspection was the key to a quality product. Defective products are returned for repair or destroyed. This drives the cost of the good products up and reduces a company's profit margin. The cost to rework defective products is unnecessary and you can potentially lose your market share because of customer dissatisfaction and higher prices.[1]

Over the past few years various quality improvement programs have been tried with varying degrees of success. A few years ago it was Management By Objectives (MBO). More recently Total Quality Management (TQM) and its Army variant, Total Quality Army (TQA), have become popular. Other similar programs in the Army include Army Communities of Excellence (ACOE) and Army Performance Improvement

Criteria (APIC). All of these programs have merit in

improving quality and more importantly, gaining employee

involvement in the entire process. Involving the employees

in finding ways to do things better is a great idea, however

management must be consistent. Management must avoid the

temptation to jump on the latest system coming down the

road. By avoiding the "system of the month" the employees

have a chance to internalize the program and obtain the

maximum benefit from it.

ISO 9000 is a relatively new quality management system

that deserves some attention. As already mentioned ISO 9000

is a set of standards first developed in Europe by the

International Organization of Standards. The term ISO

stands for equal as in isobar, which is a line of the same

barometric pressure on a weather map. ISO 9000 is an

appropriate name because it is an effort to develop a common

set of standards between and within organizations.[2] ISO

9000 has been widely accepted throughout Europe and is

gaining momentum in the United States. Theoretically ISO

9000 ensures that the proper documentation is in place so a

business can consistently do the same processes over and

over. As such, it is a framework that evaluates the

internal processes, eliminates redundancy, provides baseline

documentation for training employees to specific tasks and

most importantly, serves as a starting point for evaluating

improvements to the system. If you don't fully understand

your process you cannot begin to make it better. ISO 9000

provides this important starting point. To an

organization's external customers ISO 9000 certification

indicates this company has undergone a rigorous internal

review followed by an in-depth independent third party

audit. Interestingly however ISO 9000 does not guarantee

quality products will be produced, it is just an indication

that the same procedures will be used to produce those

products. While it is not a goal, a fully functional ISO

9000 system could produce consistently poor quality

products.[3]

CURRENT SITUATION IN USACE

USACE like many government agencies is experiencing

increasing pressure to "do more with less". Personnel

strength continues to be cut and budgets are being reduced

while at the same time work load has remained about the

same. If USACE is to continue as the Nation's engineering

and design organization it must meet its customers

expectations of quality products and excellent service. LTG

Joe N. Ballard, the newly appointed Commander of USACE, is

on the right track in two key areas. First, he is modifying

the long standing quarterly Command Management Review (CMR)

system. This had become an increasingly more detailed look

at every business area across the organization. While

extensive energy was devoted to providing data to the CMR,

very little of real management benefit was obtained from the

results. The second area LTG Ballard is reworking is the

USACE strategic vision. He is making a great effort, early

in his assignment, to lay out the long term focus for the

organization. His emphasis on improved customer

satisfaction, using the best business practices and

innovative technologies are what is needed for the future.

Certainly LTG Ballard is not the first commander to

articulate similar goals for USACE. He is, however,

following up his vision by requiring subordinate commanders

to develop their plans to implement the vision. The revised

CMR will focus on how well the strategic plan is being

implemented.[4] These initiatives will play a major role in

maintaining the viability of USACE as an essential member of the Army team and a resource to the Nation.

TQM or ISO 9000?

Many organizations, and this includes USACE, have already begun their quality journey with a TQM program. The problem for many organizations is that while they have implemented TQM they have no procedure in place to use as a benchmark to measure their improvements from. ISO 9000 is a tool that provides the means to document the existing internal procedures. Once these procedures are well understood, improvements to the overall process can be evaluated and adopted. A fully implemented ISO 9000 program provides the base to measure change from. Without the base to measure change from it is counter productive to work on improvements in the first place. My experience, with TQM without an adequate baseline, is that improvements are made on the margins and the big issues where real savings can be made are avoided. For example, often the first TQM initiatives tackled within government agencies are focused on employee quality of life issues, such as finding ways to improve the processing of TDY vouchers and other pay

actions. While this has some merit, it does not focus on core missions and processes and it is there that real change needs to be made.

The Baldrige Award, as well as the Army's, APIC program, both start with a gap analysis. This analysis is basically an ISO 9000 review of the process management procedures within the organization. In fact the Baldrige criteria references ISO 9000 as a baseline element.[5]

"Seek first to understand, then to be understood" is one of Stephen R. Covey's seven habits of highly effective people.[6] This same concept applies to organizations as well as people. An organization must first understand what and how it functions before meaningful changes can be made. This again points out the need for a baseline that can be developed under ISO 9000.

The title of this section is "TQM or ISO 9000"? the reality is, as shown above, that it is not an either or situation. ISO 9000 can stand alone but it is also a critical part of whatever quality management system is being used.

BENEFITS of ISO 9000

ISO 9000 can be implemented in one of two forms. Some organizations may choose to go through the entire process including registration. Others may just choose to implement the ISO 9000 structure without taking the final step of registration. For the purposes of this paper registration and certification under ISO 9000 are considered to be the same thing. Some organizations, in particular government agencies, may not see the need to become officially registered. This is clearly a management decision. However, as will be discussed later, more and more customers are becoming aware of what ISO 9000 registration means and the incremental cost to become registered is typically minimal compared to the cost required to implement ISO 9000.

The key question for any organization considering registration under ISO 9000 is what will be gained by becoming registered? The answer depends on several factors. For some, registration may be required as a condition of continued work with that customer. For others, it may be a way of bench marking the organization against a standard. In other organizations it may be a way of motivating the

organization to a new goal. Registration will surely improve the flow of communications within the organization and with its external customers. Having gone through the process, everyone should be speaking a common language in terms of how your organization functions. The process required to become certified and subsequently maintain that certification could replace much of the need to have audits by customers and higher headquarters.[7] The bottom line is that ultimately registration will save money (see the table on page 13).

Establishing an ISO 9000 program should improve the continuity across the organization. Often subordinate elements develop their own operational procedures without considering impacts and redundancies in other areas. The establishment of a well thought out ISO 9000 program will not be easy and it may take several reviews. The pay off will come in the form of better continuity between management levels, shifts, departments and geographically separated offices.[8]

In this age of employee empowerment some may view ISO 9000 as a way of limiting the flexibility of the work force. In reality the opposite is true. The employees need to know

and in fact want to know, what is expected of them and to what standard it is to be accomplished.[9] ISO 9000 serves as the yard stick to measure performance by. This has the potential for improving the quality of performance counseling. Individual weaknesses can be targeted and training programs to improve performance can be developed. It also provides a means to ensure that changes to the system are identified and incorporated as appropriate.

For USACE many of these same requirements apply. Customers of USACE are becoming more and more demanding - as they should be. In some cases traditional USACE customers now have the opportunity to take their work to other organizations. USACE needs to focus on meeting customer expectations in terms of quality, cost and delivery schedule. The Air Force, as one example, is well aware of what ISO 9000 registration is.[10] In years past the Air Force was required by law to use USACE as its design and construction agent. Today they have more flexibility and unless USACE can demonstrate it can deliver quality at competitive prices more Air Force work will be done outside of USACE.

Other customers, whether they are federal agencies or state and local governments, are becoming increasingly aware of ISO 9000. It could be a selling point in maintaining the Corps' competitive advantage.[11] Another common customer of USACE has been state and local governments. In the past, local governments used USACE as a source of federal dollars for water resources projects with very little if any of their own money being used. Today the rules have changed and most work requires a local sponsor cost share of 25% or more. This requirement gives the sponsor more control over USACE. The Sponsor(s) may decide to take their money and fully fund the work themselves unless USACE can demonstrate timely and cost effective project management.

Another benefit of ISO 9000 is the documentation it provides new employees. Part of the ISO 9000 process is to fully document everything each person does. Once prepared this resource provides a ready reference for the new employee to quickly come up to speed on the requirements of the job and how he/she fits into the needs of the organization. A secondary benefit of this is employees who feel better about themselves and consequently do a better

job.[12] Ultimately the entire organization and its customers

benefit from satisfied workers.

An area of potential concern may be unionized work

forces. Even across USACE unions are a way of life. ISO

9000 should be attractive to unions. The series defines and

standardizes jobs which then puts the employees less at the

whims of individual managers and more in control of the

group decision making process when considering new

procedures.[13] ISO 9000 also fits well with the Clinton

Administration's initiatives to have management form

partnering arrangements with the unions.

COST of IMPLEMENTING ISO 9000

The cost of implementing ISO 9000 depends on many

factors. The current state of existing procedural

documentation within an organization is the major cost

driver. Companies that have good management systems already

in place will find it much easier to implement ISO 9000.

Ideally a consultant should be hired to assist with the

implementation process. The good news is that the cost of

an ISO 9000 consultant has decreased as more firms are

offering that service. In fact, there is no fixed cost to

hire a consultant and it is recommended that you negotiate

to obtain the best possible price.[14] Additionally you

should select a consultant who is familiar with your

particular industry.[15] Despite these cost variables,

general cost estimates can be made. The following table is

a summary of the costs and savings documented from 620 ISO

registered companies.[16]

Sales Volume of Companies	Avg. Annual Savings	Avg. Cost per Company*
<$11 Million	$25,000	$62,300
$11-$25 Million	$77,000	$131,000
$25-$50 Million	$69,900	$149,700
$50-$100 Million	$130,000	$188,800
$100-$200 Million	$195,000	$208,700
$200-$500 Million	$227,000	$321,000

*Cost includes one time internal, external and
 registrar costs

Within USACE there are five districts testing ISO 9000.

At this point none have competed the process and all are at

various stages of implementation. The estimated costs are

ranging from a low of $120,000 to a high of $242,000.[17] The

low figure is from the Savannah District which has not

progressed as far as the other districts. This cost will

more than likely grow as they get a "better handle" on the

13

effort required. While this is a relatively small sample, initial comparisons can be made. Assuming the $100-$200 million annual budget of these five districts equates to a similar sales volume the costs appear to be in line with the survey data. The hidden costs of implementation include the lose of efficiency during implementation, potential short-term loss of business, and the man-hours spent by the in-house work force developing the required documentation. Once certified there will be continuing costs to maintain the documentation and certification. For each district this is estimated at between $25,000 and $50,000 per year.[18]

For the Corps of Engineers the cost of registration should come down some due to the development of standardized definitions and templates by the five districts currently implementing ISO 9000. An example of a potential cost savings is the need for a document control system that meets ISO standards. All five districts have solved this by developing an electronic database for this purpose. This program could be standardized and made available to all other districts saving the development effort and cost.[19]

HOW to IMPLEMENT ISO 9000

When preparing to implement ISO 9000 the most important question to ask is; "how committed is management to this effort"? Successful implementation will require the full support of management.[20] Almost every book written on the subject of ISO 9000, as well as every consultant, says basically the same thing - "the boss has to be truly committed or it will ultimately fail".[21] Resources in terms of time, money and people will need to be allocated. The time required will run anywhere from six months to two years depending on the amount of documentation already in place.[22] There may even be a down turn in performance over the short term. Will this be acceptable? If management can see the value and is committed, the first step is complete. The next step is setting up an internal implementation team, this is critical. It is this group that will bring along the "critical mass" of the organization that will help implement the change. After management support this is the next most important area for success.[23] A consultant is a valuable resource to assist the internal team through the ISO process. The consultant can provide guidance, serve as a source of general information, and conduct preliminary

audits. A trap to avoid, however, is using the consultant
to set up the process without the detailed involvement of
the internal team. Only the in house team fully understands
the organization's processes and knows how to dig and ask
the right questions that will lead to a quality program.
Most importantly there will be a greater sense of ownership
in a program developed internally.[24]

Appendix A shows the different sections of an ISO 9000
system. As you can see they are generic and easily adapted
to any organization. The only hard and fast rule is that
you must "say what you do and do what you say".[25] There may
be a tendency to want to adapt an already implemented ISO
system from another organization. This has only limited
merit. A system developed for another organization can be
used as a guide but ultimately the ISO system must reflect
the organizational structure that it is written for. As
mentioned above, force fitting an established ISO system
into an organization will not survive over the long term and
there will be no sense of ownership.

Just as a consultant should not be used to
independently develop the ISO 9000 management system, the
system should not be developed without the detailed

involvement of the employees. No one knows the system better than the people using it every day. Procedures not developed with significant input from employees are doomed from the start.[26]

As the baseline is being developed, areas that need changing may become readily apparent. Avoid solving every problem that surfaces as procedures are documented. The best approach is to fix the easy ones and maintain a log of areas to go back to later in the formal change process. If a concentrated effort is not made to establish the documentation baseline the clock will continue to run and you will not have implemented your ISO 9000 system.[27]

ISO 9000 and USACE

The previous section describes how important it is to tailor the ISO 9000 management system to the specific organization. Within USACE there are 39 engineer districts and no two of them are exactly alike. Each has a different organizational structure and missions that vary based on the needs of their geographic area and their customers. This is the major reason why it would be difficult to develop a pure USACE ISO 9000 model and force it into each district. There

17

are however, similarities and it is there that a general

USACE template could be of value.

USACE is currently testing ISO 9000 in five districts.

The ISO effort in four of these districts is being partially

funded by USACE Headquarters and the fifth district is

funding the entire process on its own. From this test it

will be possible to develop a common set of terminology and

process shells that translate the ISO 9000 elements into

areas that are easily adapted to the USACE environment.[28]

At this point in the ISO 9000 test, a decision has not been

made to adopt ISO 9000 fully across the organization. One

positive aspect that should be considered is that ISO 9000

would improve the standardization across the organization.

However, it must be remembered that in order for ISO 9000 to

succeed it needs the full support of people using it and

forcing a "one size fits all" approach is likely to fail.

In discussions with each of the test districts and the

USACE Logistics Management Institute (LMI) consultant, I

have observed several points that reinforce many of the

areas already addressed above. The first and most critical

is the need to have senior level leadership support the

effort to implement ISO 9000. Based on the progress of the

five test districts it is easy to identify those with the
leadership support for ISO 9000. Louisville District is the
closest to certification having completed its first
registration audit in February of 1997. Savannah is not
making much progress in implementing ISO 9000. While they
have had a very heavy workload, I believe, the bottom line
is less management focus and support. At another level is
the Sacramento District, which was not one of the funded
test districts. Despite paying all of the costs on their
own, the leadership made the decision to move out with ISO
9000 and they are making very good progress. Clearly
management support is needed to make ISO implementation a
success.

Another factor to consider within USACE is how much
change can an organization experience and still complete its
mission. As an organization, USACE has been working through
some challenging issues. This has been especially true over
the last four years. Starting with proposed
reorganizational efforts in 1992 that have been "on and off"
over this period; the implementation of Corps of Engineers
Financial Management Information System (CEFMIS) and Project
Management Information System (PROMIS) have created new

challenges for the employees; governmental downsizing in general has impacted USACE; changing relationships with local sponsors on civil works projects; and military workloads that vary dramatically from year to year as well as location. All are contributors to organizational stress.[29] LTG Ballard is so concerned about too much change within USACE that he has put a stop to all internal district reorganizational efforts for twelve months.[30] A decision to implement ISO across USACE at this point would be yet another stressor on the organization.

A major issue for USACE will be which district elements should implement ISO 9000. The test districts are implementing ISO 9000 in the engineering and construction divisions. While this is a good start it should only be the beginning. In my opinion, the Programs and Project Management Division (PPMD) and the Planning Division (if it is separate from engineering) of each district should also be included as a minimum. A key factor to consider is that one division within a district does not work in isolation. As a consequence the ISO 9000 system will have to cut across division and branch boundaries. Without expanding the ISO 9000 system across divisional boundaries they will not have

fully developed their processes. The bottom line is that all district elements have the potential to gain from ISO 9000. PPMD works so closely with engineering and construction, in its role as the interface between the customer and engineering and construction, that I believe, if two of the three divisions are under ISO 9000 they all should be. The lines between the project managers in PPMD and the technical managers in engineering and construction are already very fuzzy and to make a further separation with ISO 9000 would cloud the lines even more.

In conducting my research within USACE on this topic, I found that there are three people responsible for various parts of continuous improvement. There are separate representatives for ISO 9000, APIC and TQM. Not surprisingly, each was only vaguely familiar with the other areas. In my opinion this needs to be corrected. These areas are so closely related and they have such a synergistic effect that they should be centrally managed. Since ISO 9000 provides the starting place for all other quality efforts it needs to be the first system implemented.[31]

Some organizations may believe they can implement an

ISO 9000 without actually obtaining certification. This

would mean that the organization would go through the entire

process without the external certification audit. The

external audit is important because it provides an

opportunity for a "new set of eyes" to evaluate your

system.[32] You may understand it, but have you truly

documented correctly and are you following the established

procedures? The audit will answer this question.

Additionally the audit may point out some ways to improve

and break some existing paradigms. Another factor is that

registration may be the goal the employees are focused on.

Not obtaining registration may reduce employee commitment

and desire to support the program over the long term. In

looking at the test districts, those that saw actual

registration as an important goal were making the best

progress. An important consideration is that going through

the registration process and then subsequently working to

maintain that registration is a valuable experience. As Mr.

Joe Keith, from the Louisville District commented, his

preparation for an external audit is a lot more intense than

if they were doing their own review.[33] Having the shared

goal of registration as an ISO 9000 certified organization

can be a unifying experience and the incremental cost to

complete this last step is minimal in comparison to the

total cost of getting there.

RECOMMENDATIONS

For USACE ISO 9000 is a tool whose time has come. LTG

Joe N. Ballard, the new Commander of the United States Army

Corps of Engineers, in his vision statement (Appendix B) and

master strategy for guiding USACE into the 21st Century has

recognized the need to revolutionize the Corps.[34] The

vision outlined by LTG Ballard is clearly the direction

USACE needs to move toward. The question is how do you get

there? The implementation of ISO 9000 can greatly assist

this process. Its focus on improved business processes and

customer satisfaction while at the same time involving the

employees in continually reengineering the system has the

potential to pay great dividends. With a properly

documented ISO 9000 system in place it should be much easier

to identify the impacts of change on the organization.

Commanders will be able to quickly evaluate alternative

organizational structures and select the best options.

Ultimately ISO 9000 can provide the foundation to support all other Corps systems.

CONCLUSIONS

The Army Corps of Engineers should implement ISO 9000 throughout its organization. While the effort in the test districts is still preliminary, the indications are very positive and the groundwork should be laid to begin the process in a systematic manner. As a minimum the programs and project management, engineering, construction, and planning divisions should implement ISO 9000. Other elements could be considered on a case by case basis. Due to the cross division coordination that is required it may very well be something that occurs naturally. To reduce turmoil it would be best to implement CEFMIS, PROMIS and ISO 9000 sequentially rather that simultaneously. The order will be driven by the timeline to implement CEFMIS and PROMIS more than anything else.

Fortunately for the Corps of Engineers the Logistics Management Institute has already prepared several documents which provide the basis for implementing ISO 9000 in the USACE environment. These documents are:

"Toward a World-Class Engineering Organization,
Making ISO 9000 the Foundation to Quality
Management", by Jeffrey Hawkins and James L.
Hathaway

"Construction Management Excellence, Using ISO
9000 to Improve Quality Systems", by Jeffrey
Hawkins

Using these guides and incorporating the lessons learned

from the test districts should greatly ease the transition.

Following successful implementation the end result will

be an organization that not only says it is committed to

quality and customer satisfaction but one that can

demonstrate to its customers that bona fide quality systems

are in place to meet and exceed their expectations. The new

Corps will be in line with the Commander's vision,

consistently producing quality products, improving

efficiency, and demonstrating its value to the Army and to

the nation.

APPENDIX A

ISO 9000 Functional Areas

- ISO 9001 - Design / Servicing

- ISO 9002 - No Design Function - Can be applied to Construction

- ISO 9003 - Inspection & Testing Only

- ISO 9004 - Guidelines

Elements of ISO 9001

4.1   Management Responsibility
4.2   Quality System
4.3   Contract Review
4.4   Design Control
4.5   Document and Data Control
4.6   Purchasing
4.7   Control of Customer-Supplied Product
4.8   Product Identification and Traceability
4.9   Process Control
4.10 Inspection and Testing
4.11 Control of Inspection, Measuring, and Test Equipment
4.12 Inspection and Test Status
4.13 Control of Nonconforming Product
4.14 Corrective and Preventive Action
4.15 Handling, Storage, Packaging, Preservation, and Delivery
4.16 Control of Quality Records
4.17 Internal Quality Audits
4.18 Training
4.19 Servicing
4.20 Statistical Techniques

USACE Vision:

Revolutionize effectiveness: Dramatic improvement in performance and customer satisfaction will be achieved through best business practices, bold reengineering and innovative use of technology.

Seek growth opportunities: Growth will be strategically targeted to meet emerging Army and national needs, sustain and enhance core competencies, and maintain full-spectrum capabilities to the Army.

Invest in people: Enlightened leadership and a talented, productive, and diverse work force will enable the Corps to enhance its value to the Army and the Nation.

LTG Ballard has also laid out seven substrategies that build on the three main strategies. They are as follows:

Revolutionize Effectiveness
> Align for Success
> Satisfy the Customer
> Build the Team

Seek Growth Opportunities
> Serve the Army
> Enhance Capabilities

Invest in People
> Build Strategic Commitment
> Reshape Culture

ENDNOTES

[1]William W. Scherkenbach, <u>The Deming Route to Quality and Productivity</u> (Washington: Ceep Press Books, 1988), 26.

[2]Daniel Byrnes, "Exploring the World of ISO 9000." <u>Quality</u> 31, no. 10 (1992): 20.

[3]Amy Zuckerman, "EC Drops Ticking Time Bomb," <u>Industry Week</u> (16 May 1994): 45. UMI ProQuest, General Periodicals Ondisc.

[4]COL Otis Williams, <Otis.Williams.COL@hq01.usace.army.mil>, "From Where I Sit." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 7 February 1997

[5]Mark G. Brown, <u>The Pocket Guide to the Baldrige Award Criteria</u> (New York: Quality Resources, 1996), 4.

[6]Stephen R. Covey, <u>The 7 Habits of Highly Effective People</u> (New York: Simon & Schuster, 1990), 235.

[7]Roger Landrum, "12 Reasons to Implement ISO 9000," <u>Quality Digest</u> 13, no. 12 (December 1993): 42.

[8]Ibid., 40.

[9]William C. Byham and Jeff Cox, <u>ZAPP - The Lightning of Empowerment</u> (New York: Fawcett Columbine, 1992) 118.

[10]LtCol Dennis Vaillancourt, <vaillad@af.pentagon,mil> "Quality - TQM - ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 13 January 1997.

[11]Geza Pap, <gpap@pica.army.mil>, "Quality - TQM - ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-mh2.army.mil>. 14 January 1997.

[12]Byrnes, 21.

[13]Landrum, 40.

[14]Theodore B. Kinni, "Let the Buyer Beware," <u>Industry Week</u> (March 21, 1994): 19. UMI ProQuest, General Periodicals Ondisc.

[15]Amy Zuckerman and Michael Barrier, "Quality Standards the World Can Agree On," <u>Nations Business</u> (May 1994): 72. UMI ProQuest, General Periodicals Ondisc.

[16]Ross Culbert & Lavery, Inc. "ISO 9000: The Inside Advantage," <u>Inc</u>. (September 1995): 102. UMI ProQuest, General Periodicals Ondisc.

[17]Steven Stockton, <stockton@hq01.usace.army.mil>, "ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 30 December 1996.

[18]Ross.

[19]John Cable, ISO Coordinator, Logistics Management Institute, Telephone interview by author, 13 February 1997.

[20]Byrnes, 21.

[21]Melissa Larson, "Lessons Learned at Perfection," January 1997. http://qualitymag.com/isochron/0197cron.html>, 23 January 1997.

[22]Byrnes, 23.

[23]COL Herbert F. Harback, Chairman, Department of Command, Leadership, and Management, U.S. Army War College, interview by author, 13 March 1997, Carlisle, PA.

[24]Byrnes, 31.

[25]Landrum, 39.

[26]Ibid.

[27] Cable.

[28]Ibid.

[29] COL (Dr) Paul T. Harig, Director of the Army Physical Fitness Research Institute, interview by author, 4 February 1997, Carlisle, PA.

[30] Williams.

[31] Laura Struebing, "9000 Standards?," _Quality Progress_ 29, no. 1 (January 1996): 27.

[32] Dirk Dusharme, "European Commission Wants Companies to Rethink ISO 9000's Use," _Quality Digest_ 15, no. 8 (August 1995): 9.

[33] Joseph Keith, ISO Coordinator, Engineering Division, Louisville District, telephone Interview by author, 7 February 1997.

[34] LTG Joe N. Ballard, "USACE Vision & Strategy." February 1997, <http://www.usace.army.mil/essc/vision/vision1.htm>, 18 February 1997.

BIBLIOGRAPHY

"ASQC - Standards & Certification," <http://www.asqc.org/ standcert/iso.html> 11 January 1997.

Ballard, Joe N. LTG, "USACE Vision & Strategy." February 1997, <http://www.usace.army.mil/essc/vision/ vision1.htm>, 18 February 1997.

Breintenberg, Maureen. "Questions and Answers on Quality, The ISO 9000 Standards Series, Quality System Registration and Related Issues," July 1992. <http://deming.eng.clemson.edu/pub/tqmbbs/iso9000/ isoques1.txt>. 29 November 1996.

Brockbank, Thomas, ISO Coordinator, Engineering Division, Savannah District. Telephone interview by author, 11 February 1997.

Brown, Mark G. The Pocket Guide to the Baldrige Award Criteria. New York: Quality Resources, 1996

Byham, William C., Jeff Cox. ZAPP - The Lightning of Empowerment. New York: Fawcett Columbine, 1992.

Byrnes, Daniel. "Exploring the World of ISO 9000." Quality 31, no. 10 (1992): 19-31.

Cable, John, ISO Coordinator, Logistics Management Institute. Telephone interview by author, 13 February 1997

Capik, Mark, ISO Coordinator, Engineering Division, Sacramento District. Telephone interview by author, 3 February 1997.

Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Simon & Schuster, 1990.

Crosby, Philip B. Quality is Free. New York: McGraw-Hill Book Company, 1979.

Demski, Stephen.   "Resistance to Change: Why your TQM Efforts May Fail," Paper presented at the February 1993, ASCE Engineering Management Division Conference, Denver, CO.

Dusharme, Dirk. "European Commission Wants Companies to Rethink ISO 9000's Use," Quality Digest 15, no. 8 (August 1995): 9.

Federal Quality Institute. Presidential Award for Quality: 1994 Criteria. Federal Quality Institute, PA94. June 1993.

Godfrey, A. Blanton. "Integrating Quality and Strategic Planning." Quality Digest 16, no. 3 (March 1996): 15.

Goering, James, Assistant Chief of Engineering & Planning Division, Kansas City District, 11 February 1997.

Harback, COL Herbert F., Chairman, Department of Command, Leadership, and Management, U.S. Army War College. Interview by author, 13 March 1997, Carlisle, PA.

Harrington, H. James and James S. Harrington. Total Improvement Quality. New York: McGraw-Hill, Inc., 1995.

Harig, Paul T. COL (Dr)., Director of the Army Physical Fitness Research Institute. Interview by author, 4 February 1997, Carlisle, PA.

Hawkins, Jeffery and James L. Hathaway. Toward a World-Class Engineering Organization: Making ISO 9000 the Foundation to Quality Management. Logistics Management Institute, Bethesda, Maryland, April 1994.

Hawkins, Jeffery A. Construction Management Excellence: Using ISO 9000 to Improve Quality Systems. Logistics Management Institute, Bethesda, Maryland, November 1995.

Hemenway, Caroline G. and Gregory J. Hale. "Leveraging ISO 9000 for Environmental Management System Documentation," Quality Digest 16, no. 3 (March 1996): 29-34.

Hilary, Rachel. "Behind the Stars and Stripes: Quality in the USA," Quality Progress, 29, no. 1 (January 1996): 31-35.

Hunt, Jim. "Evaluating the Tradeoffs, ISO 9000: Registration or Compliance," January 1997.<http://bizserve.com/qualitymag.com/0197f2.html>. 23 January 1997.

"Introduction to ISO," <http://www.iso.ch/infoe/intro.html> 11 January 1997.

"ISO 9000 News Service: The Facts on ISO 9000 - Straight From ISO," <http://www.iso.ch/9000e/forum.html>. 29 November 1996.

Keith, Joseph, ISO Coordinator, Engineering Division, Louisville District. Telephone interview by author, 7 February 1997.

Kinni, Theodore B. "Let the Buyer Beware," Industry Week. (March 21, 1994): 35. UMI ProQuest, General Periodicals Ondisc.

Landrum, Roger. "12 Reasons to Implement ISO 9000," Quality Digest 13, no. 12 (December 1993): 39-42.

Larson, Melissa. "Lessons Learned at Perfection," January 1997. <http://qualitymag.com/isochron/0197cron.html>, 23 January 1997.

NIST Quality Program Fact Sheet, "Malcolm Baldrige National Quality Award," <http://www.quality.nist.gov/qualfact.htm>, 11 January 1997.

Pap, Geza. <gpap@pica.army.mil>, "Quality - TQM - ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 14 January 1997.

Ross Culbert & Lavery, Inc. "ISO 9000: The Inside Advantage," Inc. (September 1995): 102. UMI ProQuest, General Periodicals Ondisc.

Sacramento District Home Page. "Engineering Division ISO 9001 Certification," <http://www.usace.mil/cespk-ed/engr.html#implementationschedule>. 24 December 1996.

Scherkenbach, William W. <u>The Deming Route to Quality and Productivity</u>. Washington: Ceep Press Books, 1988.

Scicchitano, Paul, "ISO 9000 Registration Cost Drops," <u>Quality Digest</u> 16, no. 3 (March 1996): 19.

Spencer, John, LTC. <u>Total Army Quality Handbook</u>. Senior Service College Fellow Report, The University of Texas at Austin, April 1994.

Stockton, Steven. <stockton@hq01.usace.army.mil>, "ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 30 December 1996.

Struebing, Laura. "9000 Standards?," <u>Quality Progress</u>, 29, no. 1 (January 1996): 23-28.

Swiss, James E. "Adapting Total Quality Mangement (TQM) to Government," Public Administration Review, 52, no. 4 (July/August 1992): 1-7.

U.S. Department of Defense. <u>Total Quality Management Guide</u>. Department of Defense, Washington, D.C., 15 February 1990.

Vaillancourt, Dennis LtCol. <vaillad@af.pentagon,mil> "Quality - TQM - ISO 9000." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 13 January 1997.

"What is ISO 9000," <http://www.commerce-associates. com/iso/WhatsISO.html>. 29 November 1996.

Williams, Otis, COL.<Otis.Williams.COL@hq01.usace.army.mil>, "From Where I Sit." Electronic mail message to James S. Weller, <wellerj@carlisle-emh2.army.mil>. 7 February 1997.

Wilson, Lawrence A. "Eight-Step process to Successful ISO 9000 Implementation: A Quality Management System Approach," <u>Quality Progress</u>, 29, no. 1 (January 1996): 37-40.

Zuckerman, Amy, "EC Drops Ticking Time Bomb," Industry Week. (July 4, 1994): 44-51. UMI ProQuest, General Periodicals Ondisc.

_____."ISO 9000: A Program in Transition," February 1994. <http://deming.eng.clemson.edu/pub/tqmbbs/iso9000/isotrans.txt>. 29 November 1996.

_____. "The future of ISO 9000," Quality Progress, 28, no.5 (May 1995): 23-28.

Zuckerman, Amy and Michael Barrier, "Quality Standards the World Agrees On," Nation's Business. (May 1994): 71-73. UMI ProQuest, General Periodicals Ondisc.