EXPANDING THE CUSTOMER BASE:

A SOLUTION FOR INCREASING THE EFFECTIVENESS OF A SELF-CONTAINED BREATHING APPARATUS SERVICE CENTER

Research and Recommendations

Executive Leadership

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Abstract

The purpose of this applied research project was to provide Baytown Fire and Rescue Services with information that would help to determine if a full-time self-contained breathing apparatus service center technician can be partially funded through a reasonable expansion of the customer base. The expansion would include the current internal fire department customer base with an additional external customer base developed from smaller nearby fire departments.

Using historical, descriptive, and evaluative research methods, this research effort attempted to answer the following research questions:

1. What standards, regulations, and manufacturer recommended practices apply to the operation of the Self-Contained Breathing Apparatus Service Center?

2. What would be the additional parts and service requirements for the expansion of the Self-Contained Breathing Apparatus Service Center?

3. What are the City of Baytown's liability concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

4. What are the manufacturer's concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

The research procedure consisted of gathering and interpreting information, and conducting interviews. The research effort provided the following recommendations:

1. The City of Baytown's Legal Department/Risk Management Department, should continue their efforts to develop a solution to the liability issues concerning customer base expansion. Consideration should be given to explore the use of existing county fire mutual aid agreements to satisfy some of the liability issues.

2. Using the statistical information gathered from this research project, Baytown Fire and Rescue Services 1998-1999 budget for the Self-Contained Breathing Apparatus Service Center, should include the cost for a full-time service center technician, additional parts, and additional service requirements.

3. The current self-contained breathing apparatus technician should not allow compromises in the quality of service vs. quantity of service provided by the Service Center.

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Introduction

Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center activity level has exceeded the capability of the assigned Service Center technician. The Service Center performs maintenance, testing and documentation on sixty self-contained breathing apparatus and over 200 self-contained breathing apparatus cylinders. Due to the increase in the volume of service provided by the Service Center, an increase in the Service Center's operation hours has been proposed. The proposal recommends to hire one full-time service center technician. The proposal to hire the full-time service center technician has encountered funding obstacles (Baytown Fire and Rescue Services Hazardous Materials/Staff Services Division. 1997 Division Summary and Report [BFRS, 1998] January, 1998).

The purpose of this research project is to determine if a full-time service center technician can be partially funded through a reasonable expansion of the customer base. The expansion would include the current internal fire department customer base with an additional external customer base developed from smaller nearby fire departments.

Using historical, descriptive, and evaluative research methods, this research effort will attempt to answer the following research questions:

1. What standards, regulations, and manufacturer recommended practices apply to the operation of the Self-Contained Breathing Apparatus Service Center?

2. What would be the additional parts and service requirements for the expansion of the Self-Contained Breathing Apparatus Service Center?

3. What are the City of Baytown's liability concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

4. What are the manufacturer's concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

Hopefully the responses to the these research questions will provide the City of Baytown Administration, information to approve the proposed full-time service center technician for the Baytown Fire and Services Self-Contained Breathing Apparatus Service Center.

Background and Significance

In the previous research, Russell (1997), provides a description of the community and the fire rescue services :

> The City of Baytown is an incorporated eastern suburb of Houston, Texas in Harris County. The city is located along the north side of the Houston Ship Channel. Baytown contains one of the world's largest oil/chemical refineries and several other large oil, chemical, and industrial complexes. (p. 5)
>
> Baytown Fire and Rescue Services provides protection to approximately 72,000 persons inside the city limits, covering approximately 32 square miles. Additional, rural fire and rescue protection is provided to approximately 10,000 persons outside the city limits, covering an area of approximately 33 square miles. The 65 square miles are protected by five fire stations housing a total of four front line pumpers, one 75' ladder truck, one 55' water tower, one light rescue truck, one incident command bus, one 106' reserve ladder truck and two reserve pumpers. Baytown Fire and Rescue Services provides a first responder medical service, that supplements the city health department operated, emergency medical service. The proposed annual 1997- 1998 budget for the department is 5.0 million dollars (Baytown Fire and Rescue Services, 1997). (p. 5-6)

Baytown Fire and Rescue Services is staffed by seventy-five full-time employees. Seventy-one of the seventy-five personnel are civil service employees, of which one is the Fire Chief; two Assistant Fire Chiefs - one assigned to Prevention, Inspection and Investigation, and one assigned to Operations; five Battalion Chiefs - one assigned to Hazardous Materials/Staff Services (position created in 1994), three assigned to Operations, one assigned to Training; eighteen Lieutenants - three assigned to Prevention, Inspection and Investigation, fifteen assigned to Operations, and fifteen Drivers, and thirty Fire Fighters assigned to Operations. The four remaining full-time employees consist of two Civilian Secretaries and two Civilian Mechanics.

A current department organizational chart is included with this research project and can be located in **Appendix A.**

A portion the Hazardous Materials/Staff Services Battalion Chief regular assignment includes functioning as the self-contained breathing apparatus service center technician. Sixty self-contained breathing apparatus and over 200 self-contained breathing apparatus cylinders are maintained, tested and documented by the Service Center. During 1997 the Hazardous Materials/Staff Services Battalion Chief worked a total of 1,781.0 hours (BFRS, 1998), p.7.

The Hazardous Materials/Staff Services Battalion Chief devoted 683.5 hours (38.0% of the 1,781.0 hours worked) to staff the self-contained breathing apparatus service center as the service center technician (BFRS, 1998), p. 3. Major responsibility areas and percentage of time breakdowns for the Hazardous Materials/Staff Services Battalion is provided in **Appendix B.**

The increasing hours required for the operation of the Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center, is compromising the effectiveness of the Hazardous Materials/Staff Services Battalion Chief's primary responsibility areas.

The research for this project, will use the Fostering Creativity and Innovation's Seven

Blocks to Organizational Creativity Model, obtained during the National Fire Academy's October 1997 session (National Fire Academy, 1997). The session guided the Executive Fire Officers through the steps of using creativity to listen, plan, and move beyond the normal expectations of department operations. The skills learned in this session will help this research effort determine if an expanded self-contained breathing apparatus service center will help support the cost of a full-time service center technician.

Literature Review

National Fire Protection Association Standards:

Two National Fire Protection Association Standards (NFPA) were reviewed to obtain information for this research effort.

Section 5-3 (Self-Contained Breathing Apparatus) of NFPA 1500 Standard on the Fire Department Occupational Safety and Health Program, specifically addresses training, proper use, maintenance, and testing of self-contained breathing apparatus (NFPA 1500, 1992).

> **NFPA 1500 5-3.6**
>
> The fire department shall adopt and maintain a respiratory protection program that addresses selection, inspection, use, maintenance, training, and air quality testing. Members shall be tested and certified in the safe and proper use of SCBA at least annually (NFPA 1500, 1992).

NFPA 1500 5-3.7.3 requires that SCBA cylinders be hydrostatic tested as per the manufacturers and applicable government agencies standards. **NFPA 1500 5-3.8** requires that each new member shall receive a facepiece qualitative fit test before using a SCBA. The standard

also requires members to receive a facepiece qualitative fit test on an annual basis or whenever new types of scba or facepieces are placed in service for use in hazardous atmospheres. Members are required to have verification of a properly fitting facepiece before they are permitted to use a SCBA in a hazardous atmosphere (NFPA 1500, 1992).

NFPA 1404 Standard for a Fire Department Self-Contained Breathing Apparatus Program was created as the result of the recognition that there was no standards on a fire department program for self-contained breathing apparatus and this deficiency in training, maintenance and program evaluation could have a serious impact on the fire service (NFPA 1404, 1996).

NFPA 1404 2-3 requires that all newly acquired self-contained breathing apparatus shall be inspected and tested by factory certified personnel, before the unit is placed in service. Documentation of these inspections and tests are also required to be properly recorded (NFPA 1404, 1996).

NFPA 1404 Chapter 4 defines the qualifications for an self-contained breathing apparatus instructor. In addition Chapter 4 addresses annual training and certification of the users of self-contained breathing apparatus, qualitative facepiece fit testing, and record keeping (NFPA 1404, 1996).

NFPA 1404 Chapter 5 defines self-contained breathing apparatus daily and weekly service checks. Daily checks are required when fire apparatus is used daily. Weekly service checks are required when fire apparatus is not used daily. All service checks are required to be documented (NFPA 1404, 1996).

NFPA 1404 Chapter 6 defines the requirements for self-contained breathing apparatus maintenance. The Chapter addresses required user maintenance, cleaning and sanitizing

requirements, and preventative maintenance programs. Chapter 6 further requires that self-contained breathing apparatus service center technicians must be trained and certified by the manufacturer or authorized distributor. Organizations without an internal service center must contract with an outside organization to provide maintenance services (NFPA 1404, 1996).

NFPA 1404 Chapter 7 defines the requirements for testing and certification of self-contained breathing apparatus breathing air and recharging of air cylinders. The standard requires all breathing air to be tested by an accredited independent laboratory. Chapter 7 also requires that air cylinders be hydrostatic tested, filled, and records maintained (NFPA 1404, 1996).

NFPA 1404 Chapter 8 defines the process required to be used for evaluation of the self-contained breathing apparatus program. The evaluation is required to be performed annually and shall include proper documentation (NFPA 1404, 1996).

Texas Commission on Fire Protection Standards:

Municipal and Volunteer fire departments in the State of Texas are not covered by Occupational Safety and Health Administration (OSHA) standards. However, Chapter 435 of the Texas Commission on Fire Protection Standards provides administering and enforcement of NFPA 1404 for all fire departments in Texas that have full-time fire fighters. Texas volunteer fire departments are not required to meet the requirements of NFPA 1404, however, the Texas Commission on Fire Protection encourage the volunteers to voluntarily comply with the standard (Texas Commission on Fire Protection. Standard Manual for Paid Fire Protection Personnel Fourth Edition, [TCFP, 1996], January 1997).

The Texas Commission on Fire Protection enforces NFPA 1404 through inspections, found violations, and a fine process. Texas full-time fire departments are inspected for NFPA

1404 compliance every two years. Inspections for compliance may also be performed more frequently if non-compliance is discovered or complaints are received. Failure to comply with NFPA 1404 will result in monetary penalties and more frequent enforcement inspections. Continued failure of compliance with the Chapter 435 could result in judicial enforcement (TCFP, 1996).

Self-Contained Breathing Apparatus Service Manuals:

The manufacturer used by Baytown Fire and Rescues Self-Contained Breathing Apparatus Service Center has divided maintenance of self-contained breathing apparatus into two categories.

The first category is field level maintenance. Field level maintenance can be performed by members of the department trained to clean and inspect the apparatus for discrepancies such as worn or deteriorated parts. The manufacturer's field level maintenance manual also defines minor repairs that can be performed by members trained to perform field level maintenance. Service facility overhaul is the second category of maintenance. Members trained to perform service center overhaul are certified and authorized through the manufacturer. The manufacturer authorizes these certified members to perform overhaul, make all repairs, order and install service center restricted parts, perform required flow and operation testing, and return identified problem parts to the manufacturer for product evaluation (Scott Aviation. Authorized Service Facility Overhaul Manual for the Air-Pak® 2.2 and 4.5 [Scott, 1996] 1996).

Self-contained breathing apparatus programs, must be performed in accordance with manufacturer's recommendations, nationally recognized standards and state regulations. The recommendations, requirements and regulations for self-contained breathing apparatus programs all address daily/weekly inspection procedures, maintenance, testing and training.

Procedures

Literature Search:

In late September 1997, Baytown Fire and Rescue Administration identified that in order for the Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center to continue to be efficient, the Service Center would require more hours of operation. The identified problem area was examined by the researcher and a literature search commenced during early October 1997 at the Learning Resource Center of the National Fire Academy in Emmitsburg, Maryland.

The literature search was expanded during late November 1997 to include the Records Archives of Baytown Fire and Rescue Services, Baytown, Texas and the Internet. The search for literature was completed during early December 1997. The collected literature was divided into maintenance, statistical, and standards groups and provided historical as well as descriptive research information.

Interviews:

In early February 1998, the smaller area fire departments, the City of Baytown Legal/Risk Management Departments, and the self-contained breathing apparatus manufacturer were contacted for interviews concerning the expansion of the customer base of Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center. A copy of the interview request letter is included in **Appendix C.**

Interviews were conducted during mid February 1998 with each of the above contacted organization representatives. The interviews used descriptive and evaluative research to identify and collect information needed to answer questions concerning the expansion of Baytown Fire

and Rescue Services Self-Contained Breathing Apparatus Service Center customer base.

Instrumentation:

Interview Questionnaires

An interview questionnaire concerning the expansion of Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center customer base, was developed for each of the identified organizations. The customer base expansion questionnaires were developed utilizing the National Fire Academy's Research Guidelines For Conducting Personnel Interviews (National Fire Academy, 1995). The content of the questionnaires was based on the relevancy of the research questions in relationship to each of the identified organizations. **Appendix D 1.0 (Organization - Fire Department), Appendix E 1.0 (Organization - Legal Department/Risk Management Department), and Appendix F 1.0 (Organization - Manufacturer).**

After the identified organization's representatives were interviewed, their reported responses were transferred to the Interview Questionnaire Result Summary Form located in **Appendix D 1.1 through Appendix D 1.3 (Organization - Fire Department), Appendix E 1.1 (Organization - Legal Department/Risk Management Department), and Appendix F 1.1 (Organization - Manufacturer).** The gathered responses are further explained in the "Results" section of this research effort.

Statistical Information Table

Statistical information was collected from the archived 1992-1997 maintenance records of Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center. Additional statistical information was collected from the 1997 Annual Hazardous Materials/Staff Services Division Report, January 1998. The researcher developed a table to assist the reader to quickly interpret the content of this descriptive and historic research process. The table is

provided in **Appendix G 1.0 Table 1** and further explained in the "Results" section of this research effort.

Also, a projection of the number of parts used, number of repairs performed, and number of service hours required per self-contained breathing apparatus for 1999 was developed from the 1997 Annual Summary of the Hazardous Materials/Staff Services Division (BFRS, 1998). The projections were developed through averaging the annual number of parts used, number of repairs performed, and number of service hours required for maintenance with the number of self-contained breathing apparatus in use. The table is provided in **Appendix G 1.1 Table 2** and the findings are further explained in the "Results" section of this research effort.

Limitations of Research:

Literature Review Limitations

1. The literature review process identified that there was a limited amount of information concerning the expansion of a fire department self-contained breathing apparatus service center beyond their jurisdiction.

Interview Limitations

1. The number of organizations participating in the interviews were limited to the nearby fire departments, representatives from the City of Baytown's Legal Department/Risk Management Department, and a representative from a manufacturer.

Statistical Limitations

1. Detailed electronic record keeping on Baytown Fire and Rescue Services Self-Contained Breathing Apparatus began in January 1994. Prior to this date the manual record keeping process did not include details on the number of parts used, number of repairs performed, and the number of service hours required.

2. Archived records only included the actual time spent making a repair and did not include the time required for transportation, restocking, cleaning, and data entry.

3. The researcher identified several errors in the statistical information. The researcher omitted this statistical information from the research process.

Results

Literature Review Results:

The results of the literature research were used to answer the first research question:

What standards, regulations, and manufacturer recommended practices apply to the operation of the Self-Contained Breathing Apparatus Service Center?

The NFPA 1500 Standard on the Fire Department Occupational Safety and Health Program, contains a section (NFPA Section 5-3) that specifically addresses the need for training and proper use of self-contained breathing apparatus. The standard recommends that fire departments adopt and maintain a respiratory protection program. In addition to training and proper use, the standard has provisions that recommends that the respiratory protection program include maintenance and air quality testing. The standard identifies that some maintenance and testing must be performed by an manufacturer authorized service center.

The NFPA 1404 Standard for a Fire Department Self-Contained Breathing Apparatus Program was developed as a result of the recommendations of NFPA 1500. NFPA 1404 specifically addresses the requirements and specifications concerning maintenance and testing of self-contained breathing apparatus.

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has informally adopted the use of these standards as an additional measure of quality control.

Regulations

Research determined that the Texas Commission on Fire Protection has developed and adopted regulations that are enforced through state laws. The Texas Commission on Fire Protection has adopted the NFPA 1404 Standard for a Fire Department Self-Contained Breathing Apparatus Program in its entirety as a regulation. The regulation applies to all Texas full-time fire departments. Volunteer fire departments are encouraged to comply with the regulations, however, are exempted from enforcement. Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center must perform maintenance, repairs and testing as mandated by these state regulations.

Manufacturer Recommended Practices

The manufacturer used by Baytown Fire and Rescues Self-Contained Breathing Apparatus Service Center has two categories of self-contained breathing apparatus maintenance. The first category is field level maintenance. Research determined that field level maintenance can be performed by members of the department trained to clean and inspect the apparatus for discrepancies such as worn or deteriorated parts. The manufacturer's field level maintenance manual also defines minor repairs that can be performed by members trained to perform field level maintenance. Service facility overhaul is the second category of maintenance. Research determined that members trained to perform service center overhaul are certified and authorized through the manufacturer. The field level service manual and the service facility overhaul manual provides the manufacturer recommended practices on maintenance, repair and testing of self-contained breathing apparatus.

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technician utilizes the manufacturer recommended practices obtained from service manuals and service manual updates to perform maintenance, repairs, testing and quality control of self-contained breathing apparatus.

The proceeding results answered the first question: What standards, regulations, and manufacturer recommended practices apply to the operation of the Self-Contained Breathing Apparatus Service Center?

Statistical Results and Interview Questionnaire Results:

The statistical research results and the interview results of the area fire departments were used to answer the second research question:

What would be the additional parts and service requirements for the expansion of the Self-Contained Breathing Apparatus Service Center?

Table 1 located in **Appendix H 1.0** provides a six year maintenance summary of Baytown Fire and Rescue Services Self -Contained Breathing Apparatus Service Center. The results of Table 1 indicate that the Service Center activity has increased annually since 1992. The following is an explanation of the results of Table 1:

The number of self-contained breathing apparatus in service at the end of 1997 was 60 units, three times greater than the 21 units in service at the end of 1992.

One hundred thirty repairs were performed on self-contained breathing apparatus during 1992.

Three hundred fifty-nine repairs were performed on self-contained breathing apparatus during 1997.

The 1997 amount of repairs performed was over two and a half times greater than at the end of 1992.

Four hundred three parts were used in the repair of self-contained breathing apparatus during 1992.

During 1997 eight hundred forty-seven parts were used in the repair of self-contained breathing apparatus.

The 1997 amount of parts used for repairs was over two times greater than at the end of 1992.

Research uncovered an unexpected occurrence concerning the annual cost of parts used for self-contained breathing apparatus. During 1992, the annual cost of parts used to perform 130 repairs was $5,000. In 1993, the annual cost of parts to perform 147 repairs was $5,000. One hundred eighty repairs were performed in 1994 with a parts cost of $6,000. In 1995, the annual cost of parts to perform 230 repairs was $9,000. During 1996, the annual cost of parts to perform 290 repairs was $9,000. Three hundred fifty-nine repairs were performed in 1997 with parts cost of $9,000. The last three years 1995-1997 indicate no increase in parts cost even though there has been an increase in the amount of repairs performed. Due to this unexpected finding, further research of records was performed and determined that part replacement and upgrades were extensively performed from 1992-1996 and explains the cost of parts used for repairs.

Two hundred forty hours were required to service self-contained breathing apparatus in 1992.

In 1993, two hundred seventy-six hours were required to service self-contained breathing apparatus.

During 1994, three hundred ninety-six hours were required to service self-contained

breathing apparatus.

Five hundred four hours were required to service self contained breathing apparatus during 1995.

Six hundred hours were required to service self contained breathing apparatus during 1996.

In 1997, six hundred eighty-seven and a half hours were required to service self-contained breathing apparatus.

The Battalion Chief assigned to manage the self-contained breathing apparatus service center devoted 13% of his time to this function during 1992, 15% of his time in 1993, 22% of his time in 1994, 28% of his time in 1995, 33% of his time in 1996, and 38% of his time in 1997.

Research of records additionally determined that in early 1992, a Lieutenant was assigned to Self-Contained Breathing Apparatus Service Center as a service technician, but later transferred in December of 1992. No replacement was provided and the Battalion Chief assigned to manage the self-contained breathing apparatus service center assumed service technician duties.

The responses to the Self-Contained Breathing Apparatus Customer Base Expansion Interview Questionnaire (Organization - Fire Department) Questionnaire Results Summary, are located in **Appendix D 1.1 through D 1.3.** The explanation of the Questionnaire Results Summary from the respondents is contained in the following:

The demographics indicated that two respondents were fire chiefs and one respondent was a board of directors chairman. All three respondents represented volunteer fire departments, the Mt. Belvieu Volunteer Fire Department has a part-time fire chief. All three respondents reported that their departments each contain thirty-five volunteer personnel.

The Highlands Volunteer Fire Department and Mt. Belvieu Volunteer Fire Department serve 5,000 persons. The Seabrook Volunteer Fire Department serves 10,000 persons.

Question #1 requested information concerning how much of the departments total budget was allocated for self-contained breathing apparatus maintenance.

The respondent representing the Highlands Volunteer Fire Department indicated that $3,000 has been allocated in 1998-1999 budget for maintenance of self-contained breathing apparatus.

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that $3,600 ($600 for testing and $3,000 for repairs) had been allocated in 1998-1999 budget for maintenance of self-contained breathing apparatus.

The respondent representing the Seabrook Volunteer Fire Department indicated that during late 1997 they had replaced all of their self-contained breathing apparatus at a cost of $35,000. The respondent further indicated that maintenance costs for the new self-contained breathing apparatus had not been provided in the 1998-1999 budget.

Question #2 requested information concerning what brand of self-contained breathing apparatus the department used.

The respondent representing the Highlands Volunteer Fire Department indicated that Scott Aviation Air Pak® 2.2 self-contained breathing apparatus was used by the department.

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that Scott Aviation Air Pak® 4.5 self-contained breathing apparatus was used by the department.

The respondent representing the Seabrook Volunteer Fire Department indicated that Drager 4500 psi self-contained breathing apparatus was used by the department.

Question #3 requested information concerning the quantity of self-contained breathing apparatus the department required to be in service.

The respondent representing the Highlands Volunteer Fire Department indicated that 12 self-contained breathing apparatus were required to be in service..

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that 20 self-contained breathing apparatus were required to be in service.

The respondent representing the Seabrook Volunteer Fire Department indicated that 30 self-contained breathing were required to be in service.

Question #4 requested information concerning the standards the department voluntarily compliance.

The respondent representing the Highlands Volunteer Fire Department indicated the department does not voluntarily comply with standards that apply to self-contained breathing apparatus.

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that the department attempts to comply with NFPA standards pertaining to self-contained breathing apparatus.

The respondent representing the Seabrook Volunteer Fire Department indicated that the department attempts to comply with NFPA standards pertaining to self-contained breathing apparatus.

Question #5 requested information concerning the department's consideration to utilize the services offered by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Highlands Volunteer Fire Department indicated the department would utilize self-contained breathing apparatus services offered by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that the department would utilize self-contained breathing apparatus services offered by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Seabrook Volunteer Fire Department indicated that the department would utilize self-contained breathing apparatus services offered by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

Question #6 requested information concerning if the department would be willing to pay a nominal fee for services provided by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Highlands Volunteer Fire Department indicated the department would be willing to pay a fee for services provided by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Mt. Belvieu Volunteer Fire Department indicated that the department would be willing to pay a fee for services provided by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The respondent representing the Seabrook Volunteer Fire Department indicated that the department would be willing to pay a fee for services provided by Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center.

The information collected from Table 1 **(Appendix G 1.0)** was combined with the information collected from the interviews conducted with the fire departments to determine the

1999 projections of Table 2 **(Appendix G 1.1).** The information collected from the Seabrook Volunteer Fire Department was omitted from the 1999 projections because the manufacturer, parts and testing of their self-contained breathing apparatus was not compatible with the manufacturer used by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center. Table 2 **(Appendix G 1.1)** was developed from the following results:

The Projected Number of Self-Contained Breathing Apparatus in Service at the end of 1999 was determined by adding the number of Baytown Fire Rescue Services self-contained breathing apparatus in service at the end of 1997 (60 units from Table 1) with the number of self-contained breathing apparatus required to be in service from the Highlands Volunteer Fire Department (12 units from the Questionnaire Results Summary) and the Mt. Belvieu Volunteer Fire Department (20 units Questionnaire Results Summary). **The Projected Number of Self-Contained Breathing Apparatus in Service at the end of 1999 was 92 units (60 units + 12 Units + 20 Units = 92 units).**

The Projected Annual Number of Repairs Performed was determined by adding the number of repairs performed from 1992 through 1997 (1,219 repairs performed) and dividing that sum by the total number of units in service from 1992 through 1997(229 units). The average amount of repairs per unit was 5.3 (1,219 repairs performed ÷ 229 units = 5.3 repairs performed per unit). **The 1999 Projected Annual Number of Repairs Performed was determined to be 488 repairs (5.3 repairs performed per unit X 92 units projected to be in service during 1999 = 488 repairs).**

The Projected Annual Number of Parts Used was determined by adding the number of parts used from 1992 through 1997 (3,518 parts used) and dividing that sum by the total number

of repairs performed from 1992 through 1997 (1,219 repairs performed). The average amount of parts used per repair performed was 2.9 (3,518 parts used ÷ 1,219 repairs performed = 2.9 parts used per repair). **The 1999 Projected Annual Number of Parts Used was determined to be 1,415 parts used (2.9 parts used per repair X 488 repairs projected for 1999 = 1,415 parts used).**

The Projected Annual Cost of Parts Used was determined by adding the cost of parts used from 1992 through 1997 ($43,000 cost of parts used) and dividing that sum by the total number of parts used from 1992 through 1997 (3,518 parts used). The average cost per part used was $12.22 ($43,000 cost of parts used ÷ 3,518 parts used = $12.22 cost per part). **The 1999 Projected Annual Cost of Parts Used was determined to be $17,291.30 ($12.22 cost per part used X 1,415 parts projected to be used in 1999 = $17,291.30).**

The Projected Annual Number of Service Hours Required for Performing Repairs was determined by adding the number hours used on performing repairs from 1992 through 1997 (2,699.5 hours) and dividing that sum by the total number of repairs performed from 1992 through 1997 (1,219 repairs performed). The average time used on performing repairs was 2.2 hours (2,699.5 hours spent ÷ 1,219 repairs performed = 2.2 hours used per repair). **The 1999 Projected Annual Number of Service Hours Required for Performing Repairs was determined to be 1,081 hours (2.2 hours used per repair X 488 repairs projected for 1999 = 1,081 hours used).**

The Projected Annual Percentage Hours Devoted to the Self-Contained Breathing Apparatus Service Center by the Battalion Chief was determined by dividing 1999 Projected Annual Number of Service Hours Required for Performing Repairs by the estimated number of hours that a Battalion Chief works per year (2080 scheduled work hours - 200 estimated accrued

leave hours = 1880 hours estimated worked) **(1,081 service hours required ¸ 1,880 hours estimated worked = 58% of the Battalion Chief's time).**

If a full-time service technician is hired, the Battalion Chief's responsibilities would return to supervision and support of the full-time technician. The result would be, that the Battalion Chief would devote 15% of his assigned time to this function as indicated in **Appendix B.**

The preceding findings can be located in **Appendix G 1.1** Table 2 - Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center 1999 Projected Maintenance Summary. Table 2 provides the answers for second research question: What would be the additional parts and service requirements for the expansion of the Self-Contained Breathing Apparatus Service Center?

The interview questionnaire results from the Legal Department/Risk Management Department, were used to answer the third research question:

What are the City of Baytown's liability concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

The Assistant Attorney and the Risk Manager for the City of Baytown worked together to answer the interview questions. The combined responses of these two city officials can be located in Appendix E 1.1 Self Contained Breathing Apparatus Customer Base Interview Questionnaire (Organization-Legal Department/Risk Management Department) Questionnaire Results Summary. The following contains the results of the interview questions asked concerning expansion of Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center customer base expansion proposal:

Would the City of Baytown need to carry liability insurance for testing, repairing and distributing parts to an expanded customer base that would include smaller nearby fire departments?

The services provided will probably be considered a proprietary function, which exposes the city to additional liability. Property of others damaged by a City employee's negligence, while in the care, custody and control of the City, is a liability issue and is excluded under the City's liability policy. The City would have to obtain an additional liability insurance policy to cover this type of liability exposure (Bradford and Horner, February 1998).

Would the City of Baytown need to carry insurance (fire, theft, and damage) to cover the expanded customer base property while it was in the possession of Service Center? "The City's property insurance covers damage to other entities' apparatus for only specified perils outlined in the policy." (Bradford and Horner, February 1998)

What would be some of the legal department's additional concerns if we proceeded with a program to expand the customer base of the self-contained breathing apparatus service center (Several of the fire departments may be located in unincorporated communities.)?

The City should consider charging a storage fee for apparatus which is not picked up in a timely manner and prescribe a period after which the apparatus will be deemed abandoned. The apparatus of another entity may cause injury to an employee of the City and damage the City's equipment or facility. The other entities desiring the services of the City will have to release the City for any injury or death to any person and damages to any property. The City should require governmental entities to maintain certain minimum limits of insurance (Bradford and Horner, February 1998).

The proceeding results answered the third research question: What are the City of Baytown's liability concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

The interview questionnaire results of the manufacturer were used to answer the fourth third research question:

What are the manufacturer's concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

The following contains the results of the interview conducted with the district representative of the manufacturer used by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center:

Would your company require the City of Baytown to enter into a contractual agreement if Baytown Fire and Rescue Services expanded the customer base of their self-contained breathing apparatus service center? "Yes, Scott would require a new contractual agreement that would include the entities that Baytown Fire and Rescue Services would be providing self-contained breathing apparatus service." (Hagerdy, February 1998)

If required, what would be the minimum amount of liability insurance your company would require Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center to carry?

> Scott recommends commercial service centers to carry a minimum of $2,500,000 - $5,000,000 of liability insurance. However, some existing agreements between communities, such as mutual aid agreements, may contain provisions that provide liability coverage for maintenance including self-contained breathing apparatus

(Hagerdy, February 1998).

Would Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center be permitted to purchase parts directly from your company? "Scott would not sell parts directly to a fire department service center, the parts would continue to have to be ordered through an authorized Scott dealer." (Hagerdy, February 1998)

What would be some of your additional concerns if Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center expanded their customer base? "Scott would be concerned that no authorized service center parts would be distributed outside of the authorized service center." (Hagerdy, February 1998)

The proceeding results answered the fourth research question: What are the manufacturer's concerns for the Self-Contained Breathing Apparatus Service Center providing service outside of the jurisdiction?

Discussion

The literature search identified that standards, regulations and manufacturer requirements exist, that impact not only the use of self-contained breathing apparatus by fire departments, but also the maintenance performed on self-contained breathing apparatus used by fire departments. The research effort further identified that the State of Texas enforces self-contained breathing apparatus standards through state mandated regulations. Baytown Fire and Rescue Services must comply with these regulations, however the nearby volunteer fire departments do not have to be in compliance. Self-contained breathing apparatus serviced by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center will meet or exceed the state regulations,

recognized standards, and manufacturer recommendations before it is returned for use. The nearby volunteer fire departments could benefit from this service in regards to having better maintained and tested self-contained breathing apparatus.

The research indicated that the projected cost of parts for 1999 would double as compared to the cost of parts during 1997 if service was expanded to include smaller nearby fire departments. The cost of parts was discussed with the two fire department respondents who were interested in using the services of the Service Center. Both respondents indicated that they were aware of the potential cost increase to their department, but preferred the quality and short turn around time for repairs, over cost.

The results of the research generated an interest in the City of Baytown providing other services with nearby entities. Assistant Attorney and the Risk Manager agreed to assist in providing more information on the liability issues concerning the expansion of City services. In addition, the Assistant Attorney and the Risk Manager agreed to develop a course of action that would permit other entities to use the services offered by the Self-Contained Breathing Apparatus Service Center.

The researcher believes that the Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center has no intentions now or in the future to provide service other than on Scott brand, self-contained breathing apparatus. Unfortunately, one nearby department utilizes self-contained breathing apparatus from another manufacturer and therefore, would not be able to participate in the service expansion program.

It is this researcher's further belief, based on the results of this research project, that a full-time self-contained breathing apparatus service center technician, can be partially funded through the customer base expansion.

Recommendations

The research effort concerning customer base expansion of Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center makes the following recommendations:

1. The City of Baytown's Legal Department/Risk Management Department, should continue their efforts to develop a solution to the liability issues concerning customer base expansion. Consideration should be given to explore the use of existing county fire mutual aid agreements to satisfy some of the liability issues.

2. Using the statistical information gathered from this research project, Baytown Fire and Rescue Services 1998-1999 budget for the Self-Contained Breathing Apparatus Service Center, should include the cost for a full-time service center technician, additional parts, and additional service requirements.

3. The current self-contained breathing apparatus technician should not allow compromises in the quality of service vs. quantity of service provided by the Service Center.

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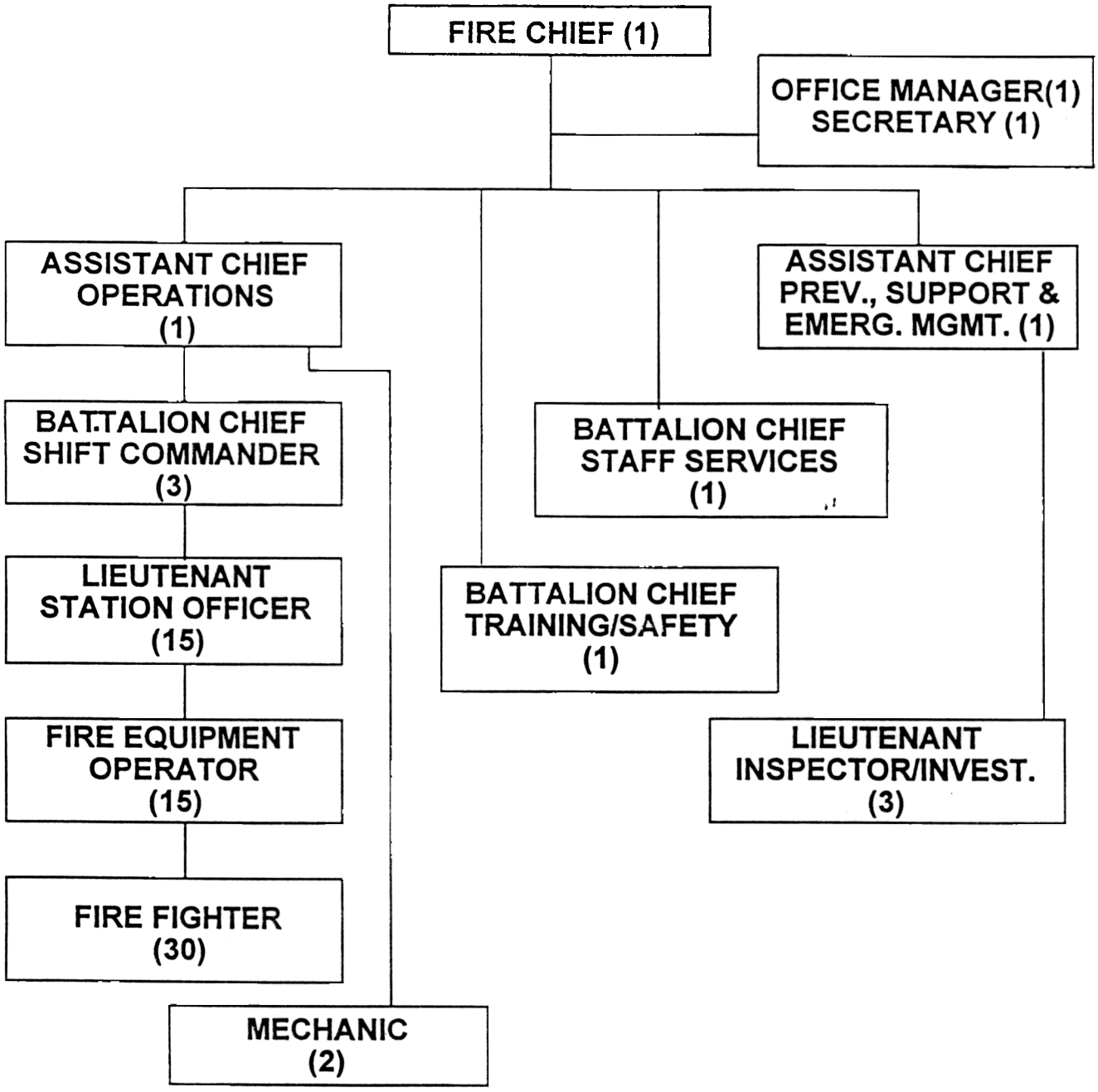
Appendix A

Organizational Chart



Appendix B

Major Responsibility Areas
and
Percentage of Time Breakdown Allocations

Hazardous Materials/Staff Services Battalion Chief
1997 Administrative Assignment

Major Responsibility Area	Allocated Percentage of Time
Emergency Management	10.0%
Emergency Responses	15.0%
Hazardous Materials	40.0%
Program Development	5.0%
Self-Contained Breathing Apparatus	15.0%
Training	15.0%

Hazardous Materials/Staff Services Battalion Chief
1997 Completed Assignment

Major Responsibility Area	Allocated Percentage of Time
Emergency Management	10.0%
Emergency Responses	7.0%
Hazardous Materials	25.0%
Program Development	5.0%
Self-Contained Breathing Apparatus	38.0%
Training	15.0%

Appendix C

Request for Interview Letter

Edward M. Russell
201 East Wye Drive
Baytown, Texas 77521

January 25, 1998

I am a fourth year student, of the four-year Executive Fire Officer Program at the National Fire Academy in Emmitsburg, Maryland. The Executive Fire Officer Program requires that each student submit a research project after completing each section of the program.

My current research project will examine concerns associated with the possibility of providing nearby fire departments the service of Baytown Fire and Rescue Services Self Contained Breathing Apparatus Service Center. Your viewpoint on this topic is critical to the success of this project. I will contact you within the next two weeks to arrange for a short meeting. If you have any questions please contact me at 281-420-7114.

Sincerely,

Edward M. Russell

Appendix D
1.0
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Fire Department
February 1998

Date: Name: Rank: Community Served:

Population Served: Type of Department: Number of Personnel On Department:

1. How much of your total budget for fiscal year 1997-1998 has been allocated for maintenance of self-contained breathing apparatus?

2. What brand name and type of self-contained breathing apparatus does your department use?

3. How many self-contained breathing apparatus does your department require to be in service?

4. What self-contained breathing apparatus standards is your department required to comply with or voluntarily attempt to comply with?

5. Would your department consider using Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center for any or all of the following: self-contained breathing apparatus service checks, maintenance and testing?

6. Would your department be willing to pay a nominal fee for services provided by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center?

Appendix D
1.1

Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Fire Department
February 1998

Questionnaire Results Summary

Date: **2-22-98** Name: **Jerry Ickes** Rank: **Vice-Chairman Board of Directors**

Community Served: **Highlands** Population Served: **5,000**

Type of Department: **Volunteer** No. of Personnel On Department: **35**

1. How much of your total budget for fiscal year 1997-1998 has been allocated for maintenance of self-contained breathing apparatus? **$3,000**

2. What brand name and type of self-contained breathing apparatus does your department use? **Scott 2.2**

3. How many self-contained breathing apparatus does your department require to be in service? **12**

4. What self-contained breathing apparatus standards is your department required to comply with or voluntarily attempt to comply with? **None**

5. Would your department consider using Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center for any or all of the following: self-contained breathing apparatus, service checks, maintenance and testing? **Yes**

6. Would your department be willing to pay a nominal fee for services provided by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center? **Yes**

Appendix D
1.2
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Fire Department
February 1998

Questionnaire Results Summary

Date: **2-10-98** Name: **James Moss** Rank: **Fire Chief**

Community Served: **Mont Belvieu** Population Served: **5,000**

Type of Department: **Combination** No. of Personnel On Department: **35**

1. How much of your total budget for fiscal year 1997-1998 has been allocated for maintenance of self-contained breathing apparatus? **$600 for testing and $3,000 for repairs**

2. What brand name and type of self-contained breathing apparatus does your department use? **Scott 4.5 4500 psi**

3. How many self-contained breathing apparatus does your department require to be in service? **20**

4. What self-contained breathing apparatus standards is your department required to comply with or voluntarily attempt to comply with? **NFPA**

5. Would your department consider using Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center for any or all of the following: self-contained breathing apparatus, service checks, maintenance and testing? **Yes**

6. Would your department be willing to pay a nominal fee for services provided by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center? **Yes**

Appendix D
1.3
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Fire Department
February 1998

Questionnaire Results Summary

Date: **2-13-98** Name: **Walter Horton** Rank: **Fire Chief**

Community Served: **Seabrook** Population Served: **10,000**

Type of Department: **Volunteer** No.of Personnel On Department: **35**

1. How much of your total budget for fiscal year 1997-1998 has been allocated for maintenance of self-contained breathing apparatus? **$35,000 - Purchased new self-contained breathing apparatus late 1997.**

2. What brand name and type of self-contained breathing apparatus does your department use? **Drager**

3. How many self-contained breathing apparatus does your department require to be in service? **30**

4. What self-contained breathing apparatus standards is your department required to comply with or voluntarily attempt to comply with? **NFPA**

5. Would your department consider using Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center for any or all of the following: self-contained breathing apparatus, service checks, maintenance and testing? **Yes**

6. Would your department be willing to pay a nominal fee for services provided by Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center? **Yes**

Appendix E
1.0
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Legal Department/Risk Management Department
February 1998

Date: Name: Position:

1. Would the City of Baytown need to carry liability insurance for testing, repairing and distributing parts to an expanded customer base that would include smaller nearby fire departments?

2. Would the City of Baytown need to carry insurance (fire, theft, and damage) to cover the expanded customer base property while it was in the possession of Service Center?

3. What would be some of the legal department's additional concerns if we proceeded with a program to expand the customer base of the self-contained breathing apparatus service center (Several of the fire departments may be located in unincorporated communities.)?

Appendix E
1.1
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Legal Department/Risk Management Department
February 1998

Questionnaire Results Summary

Date: **2-17-98** Name: **Karen Horner** Position: **City of Baytown Assistant Attorney**
Name: **Ray Bradford** Position: **City of Baytown Risk Manager**

1. Would the City of Baytown need to carry liability insurance for testing, repairing and distributing parts to an expanded customer base that would include smaller nearby fire departments? **The services provided will probably be considered a proprietary function, which exposes the City to additional liability. Property of others damaged by a City employee's negligence, while in the care, custody and control of the City, is a liability issue and is excluded under the City's liability policy. The City would have to obtain an additional liability insurance policy to cover this type of liability exposure.**

2. Would the City of Baytown need to carry insurance (fire, theft, and damage) to cover the expanded customer base property while it was in the possession of Service Center? **The City's property insurance covers damage to other entities' apparatus for only specified perils outlined in the policy.**

3. What would be some of the legal department's additional concerns if we proceeded with a program to expand the customer base of the self-contained breathing apparatus service center (Several of the fire departments may be located in unincorporated communities.)? **The City should consider charging a storage fee for apparatus which is not picked up in a timely manner and prescribe a period after which the apparatus will be deemed abandoned.**

   The apparatus of another entity may cause injury to an employee of the City and damage the City's equipment or facility.

   The other entities desiring the services of the City will have to release the City for any injury or death to any person and damages to any property.

   The City should require governmental entities to maintain certain minimum limits of insurance.

Appendix F
1.0
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Manufacturer
February 1998

Date: Name: Position:

Manufacturer:

1. Would your company require the City of Baytown to enter into a contractual agreement if Baytown Fire and Rescue Services expanded the customer base of their self-contained breathing apparatus service center?

2. If required, what would be the minimum amount of liability insurance your company would require Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center to carry?

3. Would Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center be permitted to purchase parts directly from your company?

4. What would be some of your additional concerns if Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center expanded their customer base?

Appendix F
1.1
Self-Contained Breathing Apparatus
Customer Base Expansion Interview Questionnaire
Organization: Manufacturer
February 1998

Questionnaire Results Summary

Date: **2-17-98** Name: **Scott Hagerdy** Position: **District Manager**

Manufacturer: **Scott**

1. Would your company require the City of Baytown to enter into a contractual agreement if Baytown Fire and Rescue Services expanded the customer base of their self-contained breathing apparatus service center? **Yes, Scott would require a new contractual agreement that would include the entities that Baytown Fire and Rescue Services would be providing self-contained breathing apparatus service.**

2. If required, what would be the minimum amount of liability insurance your company would require Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center to carry? **Scott recommends commercial service centers to carry a minimum of $2,500,000 - $5,000,000 of liability insurance. However, some existing agreements between communities, such as mutual aid agreements, may contain provisions that provide liability coverage for maintenance including self-contained breathing apparatus.**

3. Would Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center be permitted to purchase parts directly from your company? **Scott would not sell parts directly to a fire department service center. The parts would continue to have to be ordered through an authorized Scott dealer.**

4. What would be some of your additional concerns if Baytown Fire and Rescue Services Self-Contained Breathing Apparatus Service Center expanded their customer base? **Scott would be concerned that no authorized service center parts would be distributed outside of the authorized service center?**

Appendix G
1.0

Table 1
Baytown Fire and Rescue Services
Self-Contained Breathing Apparatus Service Center
1992-1997 Maintenance Summary

	1992	1993	1994	1995	1996	1997
Number of Self-Contained Breathing Apparatus in Service at End of Year	21	23	33	42	50	60
Annual Number of Repairs Performed	130	147	180	230	290	359
Annual Number of Parts Used	403	380	564	636	688	847
Annual Cost of Parts Used	$5,000	$5,000	$6,000	$9,000	$9,000	$9,000
Annual Number of Service Hours Required for Performing Repairs	240	276	396	504	600	683.5
Annual Percentage of Hours Devoted to the Self-Contained Breathing Apparatus Service Center by the Battalion Chief	13%	15%	22%	28%	33%	38%

Appendix G
1.1

Table 2
Baytown Fire and Rescue Services
Self-Contained Breathing Apparatus Service Center
1999 Projected Maintenance Summary

Projected Number of Self-Contained Breathing Apparatus in Service at End of Year	**92**
Projected Annual Number of Repairs Performed	**488**
Projected Annual Number of Parts Used	**1,415**
Projected Annual Cost of Parts Used	**17,291.30**
Projected Annual Number of Service Hours Required for Maintenance	**1,080**
Projected Annual Percentage of Hours Devoted to the Self-Contained Breathing Apparatus Service Center by the Battalion Chief (Supervisory and Support)	**58%**