VIII. FIRE PREVENTION

As the division responsible for preventing fire loss and managing risk, the Portland Fire and Rescue (PF&R) Fire Prevention Division (FPD) has a very important function. FPD services include building and fire protection system plans review, new construction inspections, code enforcement inspections of existing buildings, annual licensing inspections, public education, as well as fire and arson investigations. These services are typical of fire prevention divisions in other large fire departments.

BACKGROUND

The fire prevention division has improved since the late 1990s. In more recent years, it has improved professionalism and been using a more business-like approach. The change is due in part to new staff, closer management of code enforcement inspections, and willingness to try innovative approaches to fire code enforcement.

A new Enhanced Fire Prevention Program was created by the Portland City Council in July 1998 by amending the fire regulations in the City Code, Title 31, Chapter 31.90. These revised fire regulations authorized PF&R to conduct yearly inspections of all occupancies, except single-family and two-family homes. Inspection fees were authorized to pay for the additional staff to conduct more frequent fire inspections. The Enhanced Fire Prevention (EFP) program began in August 1998. The Bureau's goal for the EFP was to reduce the number and severity of fires in commercial buildings.

The audit conducted by the Office of the City Auditor in September 2000, concluded that the Bureau increased the number of building inspections by threefold – from 6,500 in FY97–98 to over 21,000 in FY99–00. However, a direct cause and effect relationship between increased inspections and reduction in fires and loss of life and property could not be determined because reductions in the number of fires were on a downward trend before the new program was implemented.⁶⁸

The audit report identified several opportunities to improve the effectiveness of the EFP Program: ⁶⁹

- Use firefighters to conduct commercial fire inspections;
- Place less reliance on dedicated fire inspection personnel;

⁶⁶ Office of the City Auditor, Portland, Oregon, *Commercial Building Fire Inspections: Opportunities to Improve Impact and Lower Costs*, September 2000, page 2.

⁶⁷ IBID, page 3.

⁶⁸ IBID, pages i and ii.

⁶⁹ IBID, pages iii and iv.

- Develop better methods for analyzing fire risk to insure that resources are directed to activities that have the biggest impact of reducing fire and fire loss;
- Work toward annual inspections of all commercial properties by geographic area;
 and.
- Develop better information on fire trends, causes, and inspection activities to assess the effectiveness of the program.

The FPD has incorporated these improvements into the overall prevention programs. However, as yet, all commercial properties are not inspected on an annual basis.

- In July 2003, a Company Fire Inspection Program (CFIP) was initiated. In FY04–05, CFIP completed 46 percent of the fire inspections performed that year. (The CFIP completed 7,659 fire inspections while the FPD completed 8,946 of the 16,605 total inspections performed. ⁷⁰)
- The FPD in conjunction with PF&R Management Services Division, Planning & Administrative Services section, began using computer software to better evaluate fire risks for the accreditation (by the Commission on Fire Accreditation International, or CFAI). (RHAVE software is recognized by CFAI.)
- Fire code enforcement, plans review, public education, business operations, and fire
 investigations meet every two weeks to summarize fire events by occupancy type and
 cause of fire.
- The commercial code enforcement function is organized by geographical areas.

PRIMARY STRENGTHS & WEAKNESSES

Primary Strengths – PF&R prevention employs many of the best fire prevention practices.

- The Fire Marshal has independent authority to close a building or structure that is found to be manifestly unsafe for the purposes being used or is a fire hazard. He/she may also require vacation of adjoining buildings, closing entrances and barricading sidewalks and streets; impose a fire watch and take other interim measures to reduce the hazard. He/she may also prevent the use and occupancy of any portion of a building or structure that is in danger of fire from the spread of an existing fire. The street is the street of the street interior in the street of the str
- FPD is involved early in the development process to review and approve engineering site plans.
- Construction and major renovation project plans for fire alarms, fire sprinklers, and other fire protection systems are reviewed for adherence to the fire code and inspections are conducted during construction.

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⁷⁰ George Godson, Senior Fire Inspection Portland Fire & Rescue, *Company Fire Inspection Program: Evaluation of Training, Customer Service and Efficiency*, December 2005, page 15.

⁷¹ http://www.portlandonline.com/auditor/index.cfm?&a=18296&c-28741, Portland City Code, Title 31 Fire Regulations, Chapter 31.20 Enforcement, section 31.20.050 Building Imminently Dangerous.

⁷² http://www.portlandonline.com/auditor/index.cfm?&a=18295&c-28741, Portland City Code, Title 31 Fire Regulations, Chapter 31.20 Enforcement, section 31.20.040 Authority at Fires or Other Emergencies.

- A professional engineer heads the construction fire code enforcement section.
- FPD and the Bureau of Development Services (BDS) plan reviewers are co-located, which provides excellent customer service and coordination.
- Fire approvals are required before certificates of occupancy are issued by BDS.
- Commercial code enforcement is organized by geographical areas.
- Fire companies are involved in low hazard code enforcement inspections.
- The Safety Learning Center & Fire Museum at the historic Belmont Firehouse is a unique asset for promoting for fire and safety education for both children and adults.
- Public education has a long history of being in the forefront of fire and safety education programs. Portland was one of 6 pilot cities to implement the nationally recognized Risk Watch® Program.
- Fire companies are used extensively in public education and community involvement programs.
- Data analysis and computer software (FIRES 2000). (RHAVE is used for fire risk assessment.)
- FPD maintains a comprehensive database (FIRES 2000) of existing commercial buildings.
- Fire investigation is staffed with fire inspectors who are sworn peace officers.
- FPD is organized into logical functional areas with senior inspectors supervising each function.
- The City of Portland, particularly the Auditor's office, is highly experienced at measuring performance and monitoring citizen satisfaction with services.
- The workload information collected is among the best. The number of hours spent in each prevention activity is collected and reported. Travel time and preparation time is reported separately from activity time.

Prevention as Firefighter Backup – Of the tasks performed by the FPD, only two are unusual activities for a prevention division. Many FPD staff are eligible as callback staff for Emergency Operations (EOPS). This is a most unusual asset that is rarely provided by prevention bureaus. It provides a surge capability for disasters or large fires and a buffer to reduce overtime. It requires that a minimum number of FPD employees (approximately 34 line qualified) (14 are limited duty) must remain line certified. This requirement to some degree increases the cost of training for these FPD employees and reduces the annual hours available for prevention, but provides a valuable capability. This practice limits the number of civilians and/or members with restrictions (21 total) that can be hired in the prevention division, but unless the latter is deemed a greater value, the practice should be continued.

Harbor – FPD is also responsible for inspection of the harbor and marina facilities, an additional responsibility for port cities. Some activities performed by the Harbor Master that could possibly be done by others. Inspecting and/or coordinating sewerage and electrical hookups at the city marina could be performed by the Bureau of Development Services. Standpipe inspections and inspections of the docks and marina could be done by the two fire boat

companies and the engine company. Making these changes will not reduce the Harbor Master staff requirements; it will only redirect the effort to more appropriate responsibilities.

Recommendation 60: Give responsibility to the two fire boat companies and the associated engine company to perform marina hookup inspections and also assist with hazardous material storage inspections in the port area.

Area for Improvement – Improvement is needed in some of the practices of the FPD and in the CFIP.

Prevention is not viewed as a core service and is not a top priority of PF&R. Most in the Bureau does not appear to have a good understanding of the purpose or benefits of strong prevention programs. This is very unfortunate because money spent on fire prevention is probably the most cost efficient expenditure of fire funds. Strong prevention programs should ultimately reduce the number and severity of fires, fire deaths, injury (to both citizens and firefighters), and property loss. Other areas that need improvement are:

- Information on fire events by occupancy type and cause of fire is not disseminated to prevention public education, emergency operations, officers, or to the PF&R core management group.
- Certification as a fire inspector is not required for promotion into the EOPS officer ranks.
- Prevention is not an alternate career path to EOPS.
- Experience in prevention is not required of PF&R top management.
- Entry into prevention is not desirable.

The CFIP (Company Fire Inspection Program) as implemented needs to be improved to be more effective and credible. The station-based fire inspection program was started in July 2003 as a result of the City Auditor September 2000 report sited above and subsequent contract negotiations. Firefighters received a two percent raise to perform these new inspection duties and the maintenance of fire hydrants was moved to the Water Bureau. Too little training (seven hours of classroom and three hours of field practice) was provided by FPD to firefighters at the start of the program. Certified Fire Inspectors receive six weeks of classroom training and six weeks of closely monitored field practice.

All firefighters (approximately 600) were trained. The initial training took about 1.5 years. Neither FPD nor Training Division resources are sufficient to meet the continuing education training needs. Other training requirements must be met first. The Training Division

⁷³ George Godson, Senior Fire Inspection Portland Fire & Rescue, *Company Fire Inspection Program: Evaluation of Training, Customer Service and Efficiency*, December 2005, page 2.

⁷⁴ IBID, page 6.

completes eight training blocks per year, each lasting four to 10 weeks. The Training Division focuses on 'High Risk, Low Frequency' events to prevent firefighter fatalities and injuries.⁷⁵

The two Battalion District Inspectors (BDI) assigned to support the CFIP are insufficient to provide the needed on-going training and support. Much of BDI time is spent doing clerical work (i.e., producing request logs, entering inspections, picking up reports and reversing fees.) Captains and Battalion Chiefs are not trained to provide the necessary coaching and quality assurance review.

Too few inspections are done per shift to develop competence in the fire code or in fire code enforcement inspections. The goal is for each fire company shift to perform six inspections per month. These inspections average about seven minutes each because the companies inspect the least complex occupancies (businesses less that two stories and apartment buildings without fire suppression systems). At this rate, each company conducts about 72 inspections per year per company per shift taking about eight hours (8.4) per company per shift a year. If the six monthly inspections are divided among the four company firefighters, each firefighter spends about 10.5 minutes a month performing 1.5 inspections or 2 hours a year performing 18 inspections.

Fire inspections are done outside the company Fire Management Zone (FMZ) or first-due area, which is thought to increase first response times. Of the 29 fire stations, 27 leave their FMZ to perform fire inspections.⁷⁷ However, the frequency of the first arriving unit coming from outside its first-due area in Portland was very low, indicating that inspections are probably not causing delays in response times.

Company inspections are believed to be poorer than FPD inspection service because:⁷⁸

- Multiple different shift personnel may inspect large apartment complexes, strip malls, or shopping malls with multiple buildings.
- Business owners or managers may be required to meet company inspectors multiple times.
- Company inspections are interrupted by emergency calls.
- During the PF&R recent strategic planning process, one focus group comprised of business owners mentioned the lack of consistency in inspections as an area needing improvement.⁷⁹

Business owners' perception of the CFIP, as reported by company officers, is that: 80

⁷⁶ IBID, page 7.

⁷⁵ IBID, page 5.

⁷⁷ IBID, page 10.

⁷⁸ IBID, pages 9 and 10.

⁷⁹ IBID, page 12.

⁸⁰ IBID, page 16.

- The use of first line apparatus with four firefighters to perform an inspection appears to be a poor use of resources.
- Conflicts exist between CFIP and EFP, which established fees for inspections by FPD
 Certified Fire Inspectors. Business owners may think they are not getting the level of
 service for which they are paying.

The average amount of time spent conducting inspections by fire companies is probably insufficient to evaluate the hazards even in a small occupancy and successfully interact with the business owner. ⁸¹

FPD fire inspections find four times the number of violations as CFIP inspections. ⁸² This outcome may be because CFIP inspects the simplest occupancies, violations are missed by CFIP, or because firefighters are reluctant to charge owners for violations. All companies have the same goals regardless of the number of calls received per year. However, company inspection programs reduce the workload of inspectors and the number needed.

The PF&R Bureau does not have the authority to inspect single family homes. This is true of most prevention bureaus. However, most fires in Portland as in other cities occur in single family dwellings with no fire detection systems (smoke alarms) or with compromised detection systems. Smoke alarms have done more than any other single factor to reduce fire and the loss of life and property due to fires. The PF&R Public Education Section focuses efforts here.

The training and certification requirements in the prevention division are inadequate to establish a highly professional organization. Additional classroom training in prevention disciplines (beyond the initial ICC Fire Inspector I) is not required for senior inspectors, specialty inspectors (i.e., hazardous material, tank, sprinkler, alarm), or plans reviewers. The Fire Marshal and Assistant Fire Marshal are required to have certification as Hazardous Material Technician I and in the adopted Fire Code. Several recommendations are made in the Training and Qualifications section of this chapter to upgrade the certification requirements. Each specialized discipline (plan review, fire alarm inspector, fire sprinkler inspector, hazardous material and so on should have specialized requirements.

Fire investigators are not as well trained as the best fire investigative units. Most FIU require extensive training as a certified peace officer, in investigative and suspect interviewing techniques, evidence gathering, case management, etc. They also receive a 400-hour Police Academy, plus recertification. Recommendations are made in the Training & Qualifications section of the report on preferred educational requirements for fire investigators.

82 IBID, page 17.

⁸¹ IBID, page 13.

Public education efforts are not as targeted as required to:

- Reduce unnecessary and inappropriate calls for emergency service,
- Provide pre- and post-testing of programs, or to
- Provide specific programs based on actual fire experience for geographical areas, occupancy classifications, and/or fire causes.

Even though fire companies spend about 15,000 hours a year in station-based prevention programs, the results of these programs are not measured and therefore are not known. More focused programs should be developed for fire stations and fire companies.

ORGANIZATION

FPD is headed by the Fire Marshal who reports directly to the Fire Chief. This reporting relationship is appropriate as it places the prevention division on the highest management level of the fire bureau. As of July 1, 2005, the Fire Marshal has four section supervisors reporting to him; the business operations supervisor, supervising engineer, Deputy Chief and the captain supervising fire investigations. All division code enforcement/ permit support staff report to the business operations supervisor. Plan review and construction code enforcement inspection staffs report to the supervising engineer. The commercial code enforcement, public education and the harbor master staff report to the Deputy Chief. Both training and special use inspection report jointly to the supervising engineer for technical issues and to the Deputy Chief for rank issues.

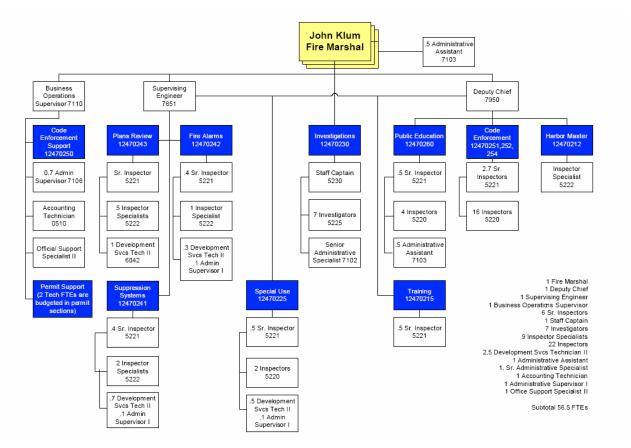


Figure 1: PF&R Fire Marshal's Office (Prevention Division) Current Organization Chart

There are many good aspects of the current organization structure. First, the organization is divided into logical functional groupings, i.e., business operations, construction code enforcement (plans review, fire alarm, and suppression inspection), commercial code enforcement, and investigations. Second, each functional section is headed by a supervisor. Lastly, the prevention division has good leadership in key positions.

Several issues are evident with the current organization that could be improved. Most noticeably, two of the more important functions (i.e., public education and prevention training) do not report directly to the Fire Marshal. Next, special use permit inspections should be part of a primary prevention function. Also, when the Fire Marshal is absent, only one supervisor (the Deputy Chief) can serve as acting Fire Marshal. This does not provide 24/7 coverage.

There are very limited career ladders within the prevention division that provide promotional opportunities within prevention as an alternative to promotions in emergency operations. The supervising engineer is in the chain of command for fire inspectors. This supervisory situation has been recognized and plans are underway to make the supervising engineer staff to the Fire Marshal.

Recommendation 61: Reorganize fire prevention into six functional groupings (construction code enforcement, commercial code enforcement, public education, fire investigation, prevention training, and business operations). This will create a direct reporting relationship from the Fire Marshal to all the primary functions of the division including public education and prevention training.

Recommendation 62: Upgrade the senior inspector position of public education to a chief of public education (possibly equivalent to a District Chief).

Recommendation 63: The public education function should be supervised by a fulltime position rather the half time position currently assigned.

Lack of sufficient training and lack of quality assurance are two of the major problems with the CFIP and with most prevention bureaus in general. Quality and consistency across inspectors and over time cannot be assured without proper training and ongoing field verification. Inconsistent enforcement and lack of fire and life safety code understanding (both within the community and PF&R) can result in less voluntary compliance with the fire code. Lack of compliance can lead to more fires with greater loss of life, injury, and property. The customer focus group results also identified inspection inconsistency as an area of dissatisfaction.

Recommendation 64: Prevention training should be expanded to include quality assurance training for fire companies as well as for FPD inspectors (seniors, specialists, and fire inspectors). The prevention training function should be supervised by a full-time fire inspector training specialist instead of a half time supervisor. The Bureau may want to consider upgrading the senior inspector position of prevention training to a chief of training and quality assurance (possibly equivalent to a District Chief, as noted above). The Battalion District Inspectors should be moved from code enforcement to the training and quality assurance section.

Recommendation 65: Add a third Battalion District Inspector to support each of the three emergency operations battalions. Two are insufficient to provide the continuous training needed to ensure that inspections performed by firefighters are of high quality in terms of adhering to the fire code, are consistently applied, and provide customer service that is perceived to be of value. Assigning a BDI to each battalion allows for better accountability and the opportunity to create competition between battalions.

Inspections for special use permits should be included under one of the primary prevention functions.

Recommendation 66: Place special-use permit inspections under one of the primary prevention functions (construction code enforcement or commercial code enforcement). It seems more closely aligned to construction code enforcement as it involves plan reviews for events and inspection of newly established services such as temporary structures, cooking, electrical and large assembly safety. However, special use inspection is one of the areas of prevention that probably should be headed and possibly staffed by firefighters. During large events, close coordination is needed between special use inspectors, emergency medical services, and emergency fire operations.

Only one Deputy Chief Fire Marshal is available to serve as Acting Fire Marshal when the Fire Marshal is not available.

Recommendation 67: Create at least one or more preferably two new Deputy Chief Fire Marshal positions to provide for 24/7 coverage by an acting Fire Marshal. This could be accomplished in a number of different ways, such as: by assigning the captain over investigations and possibly the inspector specialist harbor master as acting Fire Marshals in the absence of the Fire Marshal and Deputy Chief Fire Marshal; or by creating a new position as Deputy Chief Fire Marshal to supervise fire investigations and commercial code enforcement.

Currently, a civilian engineer supervises the construction code enforcement function. In the past, complaints have been made because a civilian supervises firefighters. Consideration is being made to move the engineer from a supervisory role to a staff role. This will resolve the immediate issue; however, this may not be the best long-term solution.

Having an engineering professional (i.e., fire protection engineer) lead fire construction code enforcement is a best practice. This provides the technical engineering expertise needed to review plans, to review engineer calculations, and to assess construction methods. Other best practices include having licensed or degreed fire alarm and fire suppression designers and/or installers perform construction inspections on these and other fire protection systems. Plan reviewers should also have special training and education qualifications in plans reviews. These qualifications are not typically found among line firefighters.

Two of the best construction code enforcement sections we have observed are Bellevue, Washington and Fort Worth, Texas. Bellevue construction fire code enforcement is staffed with all civilians. They had two fire protection engineers and licensed alarm and sprinkler specialists who performed the plan reviews and construction fire code inspections. Fort Worth had used an external engineering firm to review the plans, but was moving this function in-house using civilian plan reviewer specialists. Ft. Worth is staffed with a combination of civilian and uniform. They had uniform firefighters as alarm and sprinkler inspectors; however, they were working toward degrees as alarm and sprinkler designers or installers.

Recommendation 68: Consideration should be given to civilianizing the entire construction code enforcement function. This can be done over time while allowing the fire inspectors who want to stay in construction code enforcement to do so.

Actually, this may be a very good time to begin civilianizing the plans review section of construction code enforcement as there may be several retirements on the horizon. It is anticipated that four retirements may occur in the next three years. The learning curve for fire inspectors who are trained on the job as plan reviewers is very long. Approximately two years is required if they are certified as International Code Council (ICC) Fire Inspectors I first, which is desirable. Certified civilian plan examiners would be qualified before being hired. Therefore, their training period would be very short and consist mainly of learning the Portland plan approval standards and processes.

Proposed PF&R Prevention Division Organization Chart – Below is a chart depicting the proposed functional organization for the prevention division. Included in this proposed organization are several changes in existing position titles to suggest new position classifications. This chart does not include the number of employees in each function.

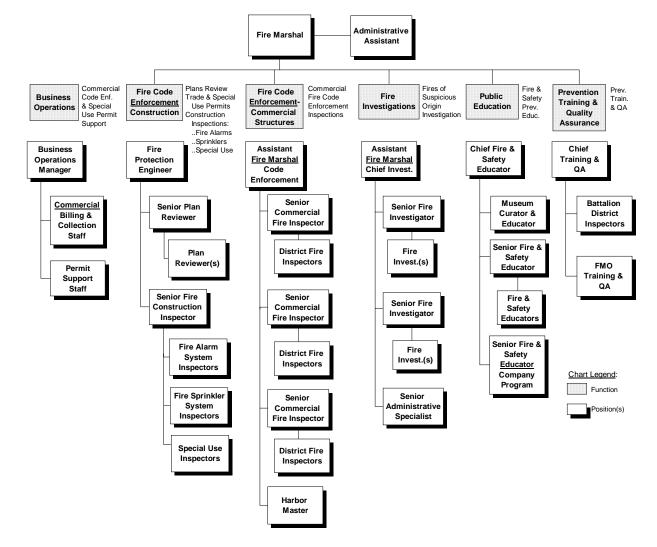


Figure 2: Proposed Organization Chart PF&R Fire Prevention Division

With homeland security issues becoming more important, some fire departments are expanding fire investigations to include security and investigation of environmental crimes. If PF&R wants to move in that direction, consideration should be given to combining the harbor master, fire investigation, environmental crimes investigation, and possibly special events under a combined function of security and investigation. This change is not shown in the proposed prevention division organization above.

FIRE MARSHAL / FIRE CODE OFFICIAL INDEPENDENCE & ADVOCACY: It is desirable for the Fire Marshal, Division Chief rank, to be as independent as possible and not subject to

being released from duty for unpopular decisions. Ideally, the Fire Marshal would serve as the 'fire code official' who should be a strong advocate for strict fire code enforcement and for other prevention and safety practices for the citizens of Portland. Fire code issues should not be made subordinate to political pressures or to other fire bureau priorities. Currently, the Fire Marshal has civil service status and is not an at-will employee.

Ideally, the Fire Marshal should be the fire code expert, should provide interpretations of the fire code, should be capable of providing expert testimony in arson cases, and should participate in the approval process of any construction variances granted by a construction review board or by the building official. The Fire Marshal should also be capable of working directly with City management, City Council, building inspection services and development (planning, zoning, etc.), business groups and construction industry groups.

In many states, the Fire Marshal's independence is protected by his/her reporting relationship to the State Fire Marshal. However, a degree of independence can be achieved any number of ways. A Fire Marshal's independence can be protected by having a direct reporting relationship to the local Fire Chief, as in Portland, and/or by creating a Fire Marshal position that is an 'appointed' yet tested position. In Oregon, the State Fire Marshal's Codes and Technical Services Unit is to be an advocate for Oregon's fire service and citizens. ⁸³ In Portland, the City Code grants the 'City Fire Marshal' the authority granted by the state to the State Fire Marshal.

Civilian Fire Marshals are employed in several cities; however, it is important he/she have expertise in fire investigations as well as fire inspection and other prevention functions. Whether a civilian or uniform fire officer is hired as Fire Marshal, consideration should also be given to requiring the Fire Marshal to be a sworn peace officer. This would fully qualify the Fire Marshal in each of the functions he/she manages. If the qualifications do not include being a sworn peace officer, qualifications as a fire investigator (not arson investigator) should be required. If a civilian Fire Marshal is selected, it may be more important for him/her to be a sworn peace office because having arrest powers and wearing an officer's uniform could improve the perception of authority.

Recommendation 69: Consider establishing an indirect reporting relationship from the Fire Marshal to an independent board, perhaps to the Bureau of Development Services Board of Appeals. This reporting relationship should help insure that the Fire Marshal's concerns and opinions are considered prior to approving variances. At a minimum, the Fire Marshal should become an ex-officio member of the BDS Board of Appeals in addition to the Director of BDS who serves in this capacity. 84

The City of Portland should consider granting the Fire Marshal joint authority with the building official to make recommendations on variances. Regardless of which official has the

⁸³ http://egov.oregon.gov/OOHS/SFM/Codes and Technical Services.shtml, January 19, 2006.

⁸⁴ http://www.portlandonline.com/auditor/index.cfm?&a=17441&c=28657, January 19, 2006.

final authority, the ideal situation is for the fire official and building official to make joint recommendations to the BDS Board of Appeals so that conflicts do not arise. When conflicts are allowed to develop, competing interests of owners, engineers, and contractors can use these conflicts to their advantage. When the fire official and the building official develop joint recommendations, a united front is created and the potential for a better conclusion is increased.

MANAGEMENT

Establish Prevention as a Core Value of PF&R – Rotating firefighters and fire officers through the 3 core fire bureau services (fire operations/EMS, training and prevention) is one approach to establishing prevention as a core service. A potential pitfall of rotating management through several functions is that they may develop only general knowledge rather than in-depth or expert understanding. One way to avoid developing only a generalist understanding is to establish certification requirements for positions in each of the functional areas. For example, management within emergency services should be qualified as paramedics and ideally should have experience on a rescue unit. Management within prevention services should be certified at a higher level of functional expertise (i.e., fire inspector, fire investigator, plan reviewer, or public educator) and should have experience in that functional area.

Rotating division chiefs into the Fire Marshal's position every three to five years should not be done unless job specific qualifications are established and met prior to rotating in. Rotating division chiefs into the Fire Marshal's position can create inconsistency in leadership, code interpretation, and application of the fire code. Unless the Fire Marshal can function as the 'fire code expert', a lower level employee (either a Deputy Chief Fire Marshal or a career position such as fire protection engineer plans examiner) must serve that function. Having the 'fire code expert' at a level lower than the Fire Marshal could create chain of command issues and could potentially reduce the significance of code decisions.

Assignment to FPD is not viewed as a choice assignment. Firefighters and captains often transfer from fire operations into FPD because promotions are available or because the schedule is more conducive to their lifestyle. Historically, many return to fire suppression as soon as they can, usually in about three years. Employees are allowed one year to become certified as a fire inspector. Common wisdom suggests that it usually takes about two years as a fire inspector to encounter most of the cases of fire code violation and become proficient. By this time, employees often transfer back to EOPS.

Recommendation 70: Make promotion to fire inspector more of a choice assignment by making it more competitive. Personal initiative should have been demonstrated through education and certification achievements as minimum qualifications in order to enter the prevention bureau. For example, certification as a plans reviewer should be required of entry level plan reviewers. Completion of national or state training in fire cause determination, possibly certified as ICC Fire Inspector I and other qualifications should be entry level requirements for a fire investigator. Entry-level fire inspector qualifications could include

hazardous material certification and possibly Uniform Fire Code certification or ICC Fire Inspector I. In essence, promotion into these entry level positions should be desirable and competitive. Personal drive should have been demonstrated by achieving non-standard requirements of firefighters.

Restructure & Expand the Company Fire Inspection Program – Another method to ensure that fire prevention becomes a core fire bureau value is to have fire companies actively engaged in performing prevention duties, as they have been. Best practices include fire companies being trained in the fire code, conducting fire inspections and determining fire cause and origin. In Ft. Worth, San Diego, Cincinnati, and Arlington County, Virginia, fire companies perform most of the fire inspections on the existing structures.

In Portland, EOPS administers the company inspection program while the FPD provides training on inspection procedures, supplies forms, direction and directives. The BDI serves as liaison between the FPD and EOPS. The Battalion Administrative Chief (BAC) has overall battalion responsibility for the company inspection program, the District Chief administers the program, and the Station Captain administers the program for the assigned station with the company officer on the shift. The FPD provides each station a Master Occupancy list of all the buildings and occupancies assigned within their Fire Management Zone and a list of inspections scheduled for the current year (fiscal year). The Station Captain schedules, coordinates, and supervises all inspection and is responsible for holding house drills covering fire regulations and inspection procedures. ⁸⁵

A Guide Sheet is provided as a checklist for inspection buildings, inside and out, for fire hazards and Fire Code violations. When violations are found, a re-inspection is scheduled for the same inspector in approximately 40 days, depending on the corrections needed. If hazards are not corrected after one re-inspections (approximately 40 days), a FPD referral is completed and forwarded to the Fire Marshal's Office, attention BDI. The BDI will conduct a follow up inspection. Legal enforcement action is the responsibility of the FPD. ⁸⁶

Recommendation 71: The CFIP should be continued but should be restructured and expanded. Captains should become responsible for the CFIP program. They should be evaluated on the fire inspection and public education performance of their company. Captains should become certified as an ICC Fire Inspector I or at least certified in the adopted Fire Code. Future promotions to captain should require certification as an ICC Fire Inspector I. Captains should be responsible for training firefighters in the adopted Fire Code and in how to conduct high quality consistent fire inspections. Captains should be responsible for conducting in-field quality assurance reviews. Inspection Checklists should be developed for each major type of occupancy to assist the fire companies.

⁸⁵ PF&R General Order No. 7, section II.

⁸⁶ PF&R General Order No. 7, sections V, VI. D., VII, VIII and IX.

FPD training should develop quality assurance methods and standard procedures. The city auditor may be able to help identify proven techniques. Firefighter training should be reorganized according to a 'train the trainer' approach. FPD battalion district inspectors should train fire captains who in turn train firefighters. A BDI should be assigned to each of the three EOPS battalions. BDIs should be the second line of maintaining quality assurance by performing independent quality assurance reviews on company inspections.

Consideration should be given to fire companies performing inspections of more complex occupancies after additional training of captains.

Potentially, companies could inspect night clubs and other assemblies during late night and weekend operating hours, low and medium rise apartments, and hazardous material storage and usage facilities. These inspections benefit the companies by increasing visibility in the community and by improving their knowledge of structures and hazards in their response area. These inspections benefit the citizens by improving the cost effectiveness of code enforcement inspections and by increasing the number of structures inspected thus improving the safety of citizens. Inspections performed by fire companies during night and week end hours may reduce prevention division overtime cost.

The current goal of the CFIP is to inspect each building or occupancy assigned at least once every two years.⁸⁷ Each fire company has an established standard to complete six inspections per month per shift. This equates to 216 inspections per year per company.

It is estimated that the actual inspection time is seven minutes which does not include travel time or paperwork preparation. The approximate time to complete an inspection is estimated to be about one hour.⁸⁸

Recommendation 72: The number of company-level inspections per month should be increased so that all commercial occupancies assigned to the CFIP are inspected annually. The goals for the number of inspections done per month and year should be based on the total workload of the fire company. In some companies where extra operational responsibilities are assigned (e.g., hazardous material response, high angle rescue, etc.) adequate time may not exist to require these companies to do fire inspections. Other company fire and medical response workload may not allow time to do an adequate number of fire inspections. In these cases, FPD or another company can be assigned the workload.

Increasing the number of fire inspections by companies also will improve competency in conducting them. Fire companies can add value to their inspections by taking the time to educate the business owner or manager on fire code requirements beyond the eight most common hazards, possible evacuation routes, disaster preparedness for the business and employees, and

⁸⁷ PF&R General Order No. 7, section IV.

⁸⁸ E-mailed dated November 23, 2005 from George Godson to Scott Fisher, subject TriData Study. 6 inspections per month per shift * 12 months = 72 inspections * 3 shifts = 216 annual inspections per company.

other fire and safety measures. Pre-fire-plans should also be completed for inspected occupancies. Prevention literature can be hung on apartment doors to educate apartment occupants on fire and safety measures. Prevention education activities of fire companies can be more directed and perhaps less time should be spent on station tours and miscellaneous in-station activities.

The bureau should evaluate whether any of the station activities defined in the Statistical Summary annual reports as 'other in-station activities' can be reduced. These activities are unspecified station/community partnership activities that are in addition to adopt-a-school, station tours, outside presentations and smoke detectors and account for significant station hours. In 2003–2004, 10,557 hours plus 238 preparation hours were spent in "other in-station activities"—too much for an "unspecified" category. Either explain the value or curtail it.89 PF&R agreed that this category should be further defined and explained that the hours are aggregate personnel hours. The total aggregate hours of 10,795 (10,557 + 238) actually represents 31 hours per company per shift⁹⁰.

A long term goal should be established to move inspections for all but the most technically challenging occupancies to the CFIP. This cannot be accomplished until company officers are better trained in the fire code and in conducting inspections, possibly not until all company officers are certified ICC Fire Inspector I. Moving most of the inspections of existing buildings to the CFIP could result in significant savings. Quality assurance procedures should also be developed and field tested prior to moving inspection responsibility for more complex occupancies to CFIP.

Sprinklerization – Requiring fire sprinklers in all structures is the most cost effective method to reduce fires and loss of life and property due to fires and to reduce the cost of the fire service in the long run.

Recommendation 73: The City of Portland should consider requiring fire sprinklers in all new structures and in all structure that undergo major renovations. Single and two family dwellings should be required to have fire sprinkler systems as well as multi-family residential and all commercial buildings.

At a minimum, all new residential two-story, basement, and large structures (5,000 square feet and more) should be required to have fire sprinkler systems.

- Fire sprinkler systems should be required for all new commercial structures and those with major renovations regardless of use.
- Consideration should be given to requiring retrofitting of existing high rise structures with fire sprinkler systems or standpipe systems.

⁸⁹ Prepared by Kathy Henderson, Management Services Division, *Portland Fire & Rescue Statistical Summary* 2004-2004, page 9.

^{90 10,795} aggregate hours / 4 person crew / 3 shifts / 29 companies = 31.0201 hours per company per shift.

• Consideration should be given to requiring existing institutional occupancies for the elderly, children, and prisoners to be retro-fitted with fire sprinkler systems.

The city could consider a tax rebate or other financial benefit to encourage the installation of fire sprinkler systems. In the long run, this is the most effective fire prevention program available and could have the greatest impact on reducing the long term cost of fire suppression and fire prevention.

Requiring carbon monoxide detectors in all properties at high risk of exposure can reduce another threat to loss of life and injury due to carbon monoxide poisoning. The city might want to consider requiring carbon monoxide detectors in occupancies in which exposure is high risk.

Standard Operating Procedures – There are standard operating procedures (SOPs) for some of the FPD duties. Detailed SOP and checklists for each prevention function and each occupancy type can improve consistency and accountability. Checklists beyond the eight most common hazards are not used to facilitate conducting consistent quality inspections or investigations.

Recommendation 74: Standard operating procedures should be developed for plan reviews, fire inspections, and fire and arson investigations. Checklists should also be developed for fire inspections for different types of occupancies. They should reference the adopted Uniform Fire Code or the Portland Fire Code citations for particular violations. Checklists also should be developed for fire investigations. Those used by other good departments should be considered as a starting point.

STAFFING

On the Prevention Division organization chart dated July 1, 2005, there are 56.5 full-time equivalent (FTEs) positions in the Fire Prevention Division. Of these, 50 are uniform (sworn) employees.

FPD Staffing – We compared Portland's FPD prevention staffing to staffing in Long Beach and Fort Worth. Two cities we examined of similar size that we examined in detail. Long Beach has a population of 475,460 and a density of 8,645 per square mile, which is more than twice the density of Portland (3,720 population per square mile). Long Beach also has a harbor master function in prevention. Ft. Worth has a population of 585,122, covers about 2.3 times the land area (350 to 150 square miles), has less than half the density (1672 compared to 3,720), and has 750 uniformed staffing compared to 650 for Portland. The detail of this comparison is shown in Appendix A.

The comparison shows that Portland FPD has significantly more staff in plans review, existing structures code enforcement, and in support staff compared to those jurisdictions. However, caution should be exercised before drawing the conclusion the FPD staff can be reduced to levels comparable to either Long Beach or Ft. Worth. Both of these cities have long histories of fire companies conducting fire inspections on existing buildings while Portland took

an initial step toward a CFIP only two years ago. Importantly, this data does not include changes made based due to TriData recommendations. For example, both of these cities were significantly understaffed in fire and safety public education while Portland is appropriately staffed. Special events can also vary significantly based on the number of large events held in the city. Additionally, these comparisons do not assess the differences in construction activity, use of computer systems, and other factors that impact staffing requirements. Workload statistics must be developed and analyzed before staffing requirements can be accurately evaluated.

Establishing Workload / Output Standards – Actual performance of the inspection functions and individual inspectors should be measured against workload standards. Ideally, standards should be set by type of inspection; however, setting detailed standards requires averaging actual data over a period of time (e.g., at least three months to one year). Until detailed standards can be established, overall standards should be used as guidelines and reasons for variations from this standard should be examined.

The first step in developing inspection workload standards is determining how much time is available for productive work by each employee. Appendix B, Computation of Available Time Productive Work in FPD, illustrates how to determine available time.

- For sworn firefighter/fire inspectors, there are 1,600 hours or (about 77 percent of 2,080 total yearly hours) available for productive work. Based on a 10-hour day, this equates to 160 days available for productive inspection work each year.
- For civilian fire inspectors, there are 1,695 hours or 169 10-hour days per year available for productive work.
- For sworn arson investigators, there are 1,493 hours or 149 10-hour days per year available for productive work.

Experience has shown that inspectors using manual inspection recording and filing systems should be able, on an overall average, to perform between four to six inspections each day in an eight-hour period, i.e., averaging 1.5–2 hours apiece. Of course, many variables influence how many actual inspections can be done. Three of the more significant variables are type of inspection performed, the amount of travel time involved, and the size and complexity of the structure being inspected. When this overall average standard is converted from an eight-hour day to a 10-hour day, the expected average number of daily inspections rises to between five to seven inspections per day.

Of the 56.5 FTEs in the prevention division, 16 fire inspectors and 2.7 senior inspectors are assigned to existing structure code enforcement. Using these gross estimates of how many inspections can be done in a day and using a 10 hour day, each inspector should be able to perform between five to seven inspections per day which translates into between 800 to 1,120 inspections per year (i.e., 160 days available for productive work * 5 = 800, 160 * 7 = 1,120). With 16 inspectors, this translates into between 12,800 to 17,920 existing structure fire code enforcement inspections per year.

In 2003–2004, a total of 23,220 inspections were made of which 15,422 were initial inspections and 7,798 were re-inspections.⁹¹ It was not indicated whether these were the total inspections performed by prevention (construction and existing).

Recommendation 75: Establish an efficiency standard for the number of inspections per day per FPD inspector, to average 5 to 7. The goals should be analyzed weekly, monthly, and yearly by each inspector and FPD management. Adjustments to this standard should be made when actual data is available to set more appropriate standards by type of inspection.

Data was not available to estimate the staff-hours used for construction plan review, fire alarm inspection and testing, suppression systems inspection, and testing or special use inspections. However, the number of plan review specialists compared to the number of construction fire inspectors seems skewed in favor of plan reviewers. In most departments, the skew is toward construction inspectors. Methods for analyzing the staffing need can be applied to construction inspection as well. However, the inspection types and the averages times used will differ from existing structure inspection.

FIRE AND SAFETY EDUCATION: Adequate public education staffing is needed not just to prevent injuries and fires that lead to more calls, but to help control call demand by teaching the public to "make the right call," and when not to call for non-emergencies. A general rule of thumb we have developed over time is that at least one full-time public fire and injury educator is needed per 100,000 in population. With a population estimated at 556,202 there should be about five to six public educators in Portland. Currently, there are four inspectors, assigned to public education and half of a senior inspector. Previously, in the Organization section, we recommended increasing the senior inspector to full-time. With this change, public prevention education will be appropriately staffed.

In addition to the four inspectors assigned to public education, the fire companies are involved in conducting several public education related station/community partnership activities. These activities include station tours, outside presentations, smoke detectors adopt-a-school and in other in-station activities. For 2004–2005, a total of 15,449 hours were spent in public education and community activities. This station involvement is excellent; however, care is needed to insure that the goals of these programs are being achieved.

Portland has had one of the best public education programs and has won awards from IAFC for its excellence and innovation. TriData has in the past undertaken research into the transferability of Portland's approach to other cities and counties. This effort deserves kudos.

FIRE INVESTIGATION UNIT STAFFING: The workload for the FIU has remained fairly stable for a number of years. The trend of fires many have shifted downward in the past two years. The table below portrays the workload history of the FIU from 1997/98 to 2004/05.

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⁹¹ Kathy Henderson, Preparer, Management Services Division, Portland Fire & Rescue, *Statistical Summary 2003-2004*, page 18.

	<u>1997/</u> 1998	<u>1998/</u> 1999	<u>1999/</u> <u>2000</u>	<u>2000/</u> <u>2001</u>	<u>2001/</u> <u>2002</u>	<u>2002/</u> <u>2003</u>	<u>2003/</u> <u>2004</u>	<u>2004/</u> <u>2005</u>
Arson	446	456	476	386	398	449	347	327
Explosions	56	67	50	63	58	32	69	69
Accidental	332	301	359	427	382	430	422	362
Undetermined	17	35	31	17	22	23	29	53
JWF	60	59	67	87	91	73	47	53
Explosives Other	<u>88</u>	<u>94</u>	<u>75</u>	<u>55</u>	<u>97</u>	<u>59</u>	<u>56</u>	<u>73</u>
Total	999	1012	1058	1035	1048	1066	970	937

Table 1: Number of Investigations (1997/98 – 2004/05)⁹²

Investigation caseload (number of cases per investigator) is a workload indicator that can be compared nationally. A reasonable caseload has been found to be about 100 to 150 fires investigated per investigator. This statistic should be reported annually. Using the seven investigators assigned to FIU as of July 1, 2005, the investigation caseload averages about 134 cases per investor. This suggests that the staffing for FIU is appropriate. The hours spent per successful and unsuccessful prosecution should be compared.

SUMMARY OF RECOMMENDED STAFFING CHANGES FOR FIRE PREVENTION DIVISION: There are a few prevention areas that appear to be under staffed. Recommendations were made to:

- Increase the supervision positions of public education and prevention training from half time positions to full-time positions,
- Upgrade the supervisory position for fire investigations to a chief position that can function as a Deputy Chief Fire Marshal, and to
- Add a third BDI to support 29 stations.

These changes should be made by reallocating the current prevention staff.

There is insufficient staff in business operations to fully staff the special use permit support five days a week as there are only 1.5 employees assigned to this function. The permit function now closes at 3:30 P.M. We also recommended adding duties to business operations to assist with the clerical aspects of a self-inspection program. Business operations will also assist with increased performance reporting. Based on the comparisons to other cities in Appendix A, we cannot recommend increasing the staff of business operations.

We also explored the possibly of reducing business operations staff by combining the 'trade' or construction permitting function with BDS permitting function. At this time we do not see opportunities for staff reductions by combining these functions.

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⁹² Provided by Captain Rich Stenhouse, Chief Investigator, Portland Fire & Rescue, *Fire/Arson Investigation Unit Statistical Summary*, updated 7/26/2005.

CIVILIAN VERSUS UNIFORMED FIRE PREVENTION BUREAU PERSONNEL: Although most fire prevention bureaus have historically staffed prevention bureaus with uniformed firefighters and officers, efforts to reduce cost, improve professionalism, and fill positions shunned by main firefighters, have lead many bureaus to hire civilians in some prevention positions, primarily as plan examiners, construction fire inspectors and public educators. It remains common though not universal practice to use uniform firefighters as fire investigators and best practice includes certifying fire investigators as peace officers. Best practice also requires prevention to be established as a core value throughout the bureau, so a completely civilian prevention division may not be desirable. However, firefighting skills are not sufficient to provide the technical expertise needed to establish a top-notch prevention division.

During the interviews, it was suggested that it is a very difficult transition from firefighter to fire inspector because firefighters are accustomed to 'sitting in the backseat'. Firefighters are trained to work within a highly structured rank structure where decisions are made by company officers. It was suggested that the transition from paramedic to fire inspector is easier because paramedics have experience being responsible for decision-making within established protocols. Paramedics are also trained to deal with patients under very stressful conditions. Therefore, according to interview comments, not all firefighters are a good fit as fire inspectors because inspectors should have excellent people skills, the ability to handle stress, ability as a self-starter, aggressive and have experience with independent decision-making.

Civilian fire inspectors perform very successfully in other cities, such as Colorado Springs, Colorado, Phoenix, and Mesa, Arizona. Many other prevention bureaus use a mix of civilians and uniform employees, such as Long Beach, Bellevue, and Ft. Worth. Some bureaus contract for plan examination services and use contract fire inspectors to augment the permanent staff. Perhaps, more importantly, it is easier to recruit more varied individuals, many of whom may already have experience and education in engineering, fire sprinkler and alarm installation and design, building construction, or education.

Construction code enforcement, public education, prevention training, and business operations can be civilianized. Non-supervisory employees can be civilians with uniform officers as supervisors and managers. All positions in prevention except fire and arson investigator can be civilianized; however, this approach hinders creating prevention as a core function of the fire bureau.

Recommendation 76: Consider civilianizing construction fire code enforcement under the supervising engineer. The bureau may also want to consider civilianizing all or part of public education, too.

In comparing the cost of civilian against uniformed inspectors, the assumption is often made that civilian inspectors are less expensive. There is no data to suggest this is always the case and each jurisdiction needs to make their own comparison, using local salary information.

Annual salaries for civilian inspectors are generally less that for trained firefighters. Retirement costs are usually less for civilians than firefighters because retirement age is later and benefits are often lower.

Depending on the classification given to the positions, civilian inspectors can cost more. In Bellevue, two fire protection engineers serve as plan examiners. In Mesa, inspectors are classified at the equivalent rate of fire captains, a model that would cost more than using firefighter inspectors. The project team believes a more appropriate classification would be similar to building inspectors at various levels based on responsibility, experience, and certifications.

SELF-INSPECTIONS: Self-inspection programs are being introduced as a cost saving technique to reduce the need for on-site inspections by either certified fire inspectors or fire companies. When successful, self-inspection programs both educate business owners on fire safety and achieve voluntary fire code compliance. We strongly endorse these programs; however, they must be actively advocated and managed. PF&R has tried self-inspections but has discontinued the practice.

Recommendation 77: Establish a self-inspection program for the lower risk businesses. This reduces inspection workload. Prevention training, fire captains, and perhaps public education should be involved in developing the program. Many of the objections of fire companies performing fire inspections could be addressed by such a program. Fire companies could then focus inspection efforts on more hazardous properties where fore knowledge of hazards, layout, etc. would be more advantageous.

Only those occupancies that have a history of zero hazards for a period of time should be allowed to conduct self-inspections. No charge or a very small charge should be made for this program. To pay for the self-inspection program, the bureau may want to consider raising the annual business license fees to cover the minimal cost for self-inspections. The fire permits fees could be lowered (or not raised) to exclude this basic charge.

Periodically, every three to five years, an on-site fire inspection could be performed by fire companies as a courtesy inspection at no-charge for these occupancies. If violations are found, a report could be provided the business owner at no cost. If violations are found a second time, the business should be taken off the self-inspection program.

Until e-commerce is available, self-inspection forms can be mailed or delivered by fire companies to these businesses. Returned forms can be evaluated by fire companies and forwarded to prevention for analysis and follow-up.

TRAINING & QUALIFICATIONS

Improve Professional Prevention Certification Requirements – Prevention should be established as a highly trained professional organization with competitive hiring and

promotion standards that allow selection of the best candidate whether civilian or firefighter/company officer. All FPD positions should have minimum certifications and experience. Supervisory positions and higher levels in specific prevention disciplines (plans review, fire inspection, fire/arson investigation, and public education) should require more advanced certifications. Employees attaining more than the minimum level of qualifications for a position should receive certification pay for additional certifications obtained. Career progression within FPD should be established so that employees interested in specializing in prevention can concentrate on attaining higher levels of prevention certifications. Career progression across disciplines within prevention also should be established so the inspectors can be promoted to plan examiner or arson investigator for example. Civilians as well as firefighters, both within and outside PF&R, should be considered for positions in FPD.

Supervisory positions should be created with specific certifications and experience requirements for each of the major functions in FPD (plans review, fire alarm and sprinkler construction inspections, code enforcement inspections, fire and safety education, and fire/arson investigation). Supervisors should be working inspectors and should be responsible for assigning and reviewing work to insure high productivity and quality of work.

Minimum qualifications of certification and experience should be developed for all positions in prevention. Ideally, the required level of certifications would be attained prior to entering prevention rather than acquired after transferring into prevention as is presently done.

Recommendation 78: Develop separate position descriptions for each of the disciplines. Qualifications should be developed for all positions in the prevention division (management, supervisory and staff positions including Deputy Chief Fire Marshals, functional supervisors, plan reviewers, fire inspectors, fire investigators, arson investigators, and public education specialists).

It is important to establish qualifications for both sworn and non-sworn applicants to allow for the flexibility of hiring either civilian or sworn employees.

This career ladder should be within the non-supervisory ranks of plans examiners, fire inspectors, fire investigators. There could also be lateral progression from fire inspector to either plan examiner or fire investigator. The highest level of these non-supervisory classifications should be equivalent to a captain rank.

In order to establish prevention as a core value of PF&R, the prevention division employees should be highly qualified as fire code experts with specialists in each aspect of prevention (i.e., fire code knowledge, plans review, fire alarm and fire sprinkler construction inspection, fire code enforcement inspection, fire and safety education, prevention training, and quality assurance and fire investigations). Certification as fire inspectors and fire investigator should be minimum qualifications for promotion into management positions in prevention.

Recommendation 79: Establish minimum certification requirements for all positions in the prevention division. At the entry level, firefighting experience and training, Oregon EMT Basic Certification, and a valid state driver's license should not be the only special requirements. Consider requiring completion of the classroom work for ICC Fire Inspector for fire inspectors, IBC Plan Reviewer for plans examiners and etc. Develop position descriptions for at least two and possibly three levels of fire inspector, fire investigator, arson investigator and plans examiner so that internal progression is available based on experience, education, training and additional certification.

The position requirements for Deputy Chief Fire Marshal of construction code enforcement should include at a minimum certification as a plans examiner and a high level of certification as a fire inspector. Preferably he/she should have several years of experience as a fire inspector and ideally would have attained a high level of certification as both a plans examiner and fire inspector.

The position requirements for the Deputy Chief Fire Marshal of fire investigation should require certification at a high level as a fire investigator which also includes being a certified as a sworn peace officer.

For the Fire Marshal, minimum certification should be a fire inspector and fire investigator and some prior management experience in fire prevention should be required. Ideally, the Fire Marshal qualifications would require achievement of a high level of certification as fire inspector and fire investigator. Certification as a sworn peace officer could be considered an outstanding qualification rather than a requirement. These higher level qualifications establish the Fire Marshal as 'the fire code technical expert' who has strong technical credentials, knowledge and experience which fully qualify him/her to advocate for strong fire prevention programs.

Prevention should become an alternative career path to EOPS. A goal of the bureau should be to establish career promotional ladders within the prevention division to promote more professionalism and prevention expertise and to establish an alternative career to emergency operations. The bureau may want to consider establishing a requirement of fire inspector I as an entry level requirement for fire investigator and perhaps for plan reviewer. It may also want to establish requirements of certifications as fire inspector and fire investigator as requirements for Deputy Chief Fire Marshal and Fire Marshal and captain in fire investigations. Finally, it may establish requirements for harbor master as fire inspector and hazardous material certification, etc.

Improve EOPS Management Training in Prevention Disciplines – Prevention should become a core service of PF&R just as emergency medical services have become. Therefore, all PF&R captain applicants should be required to attain certification as a basic fire inspector and certified in fire cause and origin determination.

Recommendation 80: Develop a plan to certify all current fire captains as ICC Fire Inspector I. The bureau also may want to require future company officer (i.e., captain) candidates to the certified as ICC Fire Inspector I as an eligibility requirement.

A train the trainer approach can be used to develop a training program for fire captains. Fire captains should then be responsible for training the firefighters they command. Captains should be trained in the adopted Fire Code for the occupancies for which they are responsible. They should be trained on proper procedures for conducting inspections in various occupancies inspected in the CFIP. They should be trained on how to evaluate inspection results to identify problems in procedures or knowledge. Subsequently, BDI's should be trained in how to monitor the quality of inspections performed across inspectors over time and BDI should train captains in quality assurance methods.

It is desirable that the top management of the fire bureau (Division Chiefs and Fire Chief) be knowledgeable in the three core services of fire operations/emergency medical services, training, and prevention. Therefore, it is desirable that employees in management level positions (perhaps beginning at the captain or battalion chief level) obtain functional knowledge and expertise in the three core services. This can be accomplished a number of ways; however, we recommend the following:

Recommendation 81: Establish a promotional requirement for battalion chiefs to demonstrate substantial knowledge in each of the three core services (operations, training, and prevention). The qualification should be substantial knowledge (i.e., certified as an intermediate fire inspector and/or fire investigator). Consideration could be given to requiring management experience at either the captain, battalion chief or Division Chief level in each of the 4 core services. However, this requirement could slow down promotional opportunities as a minimum of six to nine years (two to three years in each core service) would be required. It could also complicate the promotional process and limit employees interested in specializing in one function. The principal benefit of requiring battalion chief applicants to have management experience in each of the three core services is to develop a broader perspective of how to allocate and deploy fire bureau resources to accomplish the overall objectives of the bureau.

For management positions lower than battalion chief, functional and/or managerial expertise can be developed in the three core services (and potentially in training) in several ways. Some of these are suggested below:

- Require rotation of officers (captains and battalion chiefs) through the three core services.
- Allow requested rotation of firefighters through the three core services.
- Establish a requirement that the highest classification of firefighters be certified as a basic fire inspector.
- Establish an eligibility requirement for promotion to captain that requires being a certified as a fire inspector, fire investigator, and fire instructor in addition to being a paramedic that is currently required.

The bureau may want to consider having all top management in PF&R become certified as ICC Fire Inspector I. This would be a strong symbol that fire prevention expertise is required to be in fire top management.

Improve Fire Investigation Training – Separate job descriptions do not exist for fire investigators, senior inspector/fire investigator, or chief fire investigator. These positions are classified as Fire Inspectors or senior fire inspectors.

Recommendation 82: Separate job classification series for fire and arson investigators should be developed. Consideration should be given to establishing an entry-level requirement of certification as ICC Fire Inspector I and in fire origin and cause determination.

FIU efficiency can be improved and evidence can be better preserved by training fire company officers in fire cause and origin determination.

Recommendation 83: The Fire Investigation Unit should develop a fire company cause and origin determination program that includes standard operating procedures, possibly checklists, results reporting and company training material. FIU should monitor the results of company determinations periodically to ensure the quality and consistency of procedures and results. Fire company officers (i.e., captains) should be certified in fire cause and origin determination or as a basic fire investigator so they can be more capable of securing fire scenes and in determining fire cause and origin.

Continuing education requirements for fire investigators have not been established. In most prevention divisions, it can take several years, about four, for a new fire investigator to become a fully qualified fire investigator, which also includes becoming a certified peace officer.

Recommendation 84: Establish a continuing education curriculum for fire investigators. Consider establishing a schedule similar to that used by the Cincinnati Fire Department which is:

- During the first 1.5 years, the basic fire investigation and the advance fire investigation courses at the Ohio Fire Academy are required.
- The Regional Crimes Information Center (RCIC), Module 1 & 2 are required.
- The 23-week Cincinnati Police Academy is required.

After becoming fully certified as an arson investigator (a peace officer and a fire investigator), a training curriculum defines additional courses as continuing education requirements. These are:

- REID Interviewing and Interrogation,
- Fire Investigation at the National Fire Academy,
- Interview & Interrogation at the National Fire Academy,
- Arson Problem at the National Fire Academy for officers only,
- ATF/Bomb Course at the ATF Academy,
- FBI/Bomb Course,
- FBI/Arson Course.

- Fire Findings Electrical Class,
- ATF Courtroom Testimony,
- Fire Modeling Dynamics at the National Fire Academy, and
- ATF Fire Investigation for Prosecutors.

Cincinnati and Salt Lake City FIU provide good models for best practices for a FIU.

FEES & OTHER FUNDING SOURCES

Fees – The viewpoint we encourage on fees is that the code enforcement functions (construction and existing structures) within fire prevention should be self-funding to the extent possible, even though some citizens and businesses view this as double taxation. Fire and safety education and fire investigations should be funded through the general fund. The rationale is that only a subset of the population are users of the service should and bear its cost since all citizens do not require the service. The users of fire prevention code enforcement services are those involved in construction; in enterprises (businesses and institutions) that require annual licensing; in using or storing hazardous materials and in owning and managing residential homes and apartments. One could argue that all citizens benefit from safety, but fees for inspections are widely used.

The fees charged should be the fully loaded cost of providing the service. This cost includes all the direct costs (salaries, cost of prevention computer systems, cars, and other direct costs), fire indirect costs (departmental overhead), prevention indirect costs (management and clerical) and benefits indirect costs.

Fees charged for construction code enforcement should totally fund the function. Ideally, these fees would be based on the construction project cost. Long Beach is an excellent model for accessing these types of fees. Portland's permit fees are tied to the valuation of the work to be performed, which is recommended. However, the charges appear to be too low to even cover direct cost. For example, the minimum fee for work valued from \$1.00 to \$500.00 is \$30.80. This will not cover the cost of one inspection trip.

Recommendation 85: Construction (alarms, sprinklers, standpipes, etc.) and special use permits fees should be tied to the amount of work required to perform the necessary plan reviews and on-site construction fire inspections.

This fee should cover the fully loaded costs of the plan review and any inspection trips required to approve the project. For example: site plans are reviewed that require at least one field inspection trip to insure that hydrants are properly spaced, fire access meets code, etc. Depending on the size of the project multiple inspection trips may be required. The number of inspection trips should be estimated. The fully-loaded cost of the plan review and the inspection trips should be covered by this fee.

Below are examples of construction fees charged by a city in Texas. These fees also did not appear to cover the fully loaded cost. These are provided as examples of how much other cities charge.

•	Testing Sprinklers, Standpipes & Fire Lines	\$100 per visit
•	Extinguishing Systems	\$ 60 per inspection
•	Fire Alarm Systems (Per Floor)	\$ 75 per floor
•	Fire Alarm Systems (Required 15,000 sq. Ft. Zones)	\$ 75 per zone
•	Pressure Test	\$100 per visit
•	High Rise List Safety System (Testing Before CO)	\$200 per test

Currently, a re-inspection fee is not charged on construction and special use permits.

Recommendation 86: Re-inspection fees should be charged for construction re-inspections. Consideration should be given to charging re-inspections fees for each subsequent re-inspection similar to the re-inspection fees charged for existing structure re-inspections.

Other cities often charge fees for compressed gas installation and repair, fire pump and related equipment installation and modifications, flammable and combustible liquids, hazardous material storage, industrial ovens, LP-gas installation or modifications, private fire hydrants and spraying, and dipping installation and modifications. Consider issuing permits for these installation, repair, and modifications.

Recommendation 87: Fees should cover the fully loaded costs of plan review and construction fire inspections. Historical data from FIRES2000 can be used to develop averages on the amount of travel time, preparation time and inspection time is required to do these inspections. Ideally, different averages can be developed for alarms, sprinklers, etc.

An implementation plan should be developed for adopting a more comprehensive fee structure. Long Beach had a successful approach that took several years to phase in.

The fees for inspections of existing structures are extremely low. Apartments with 50 units in one building have a base fee of \$45 Hotels and motels with 101 units or more cost the base fee of \$45, plus \$1 per unit. Non-residential inspection fee are based on the square footage, which is a good measure of size which is one of the indicators of inspection time required.

Recommendation 88: Fees for inspections of existing structures should cover the fully loaded cost of these inspections. Consideration should be given to establishing fees for inspections of existing structures by occupancy type and square footage as the time required varies by type and size.

Long Beach and some other fire department charge for inspections done by the fire companies. Usually these fees do not cover the fully loaded costs of the inspection because a four-person crew and a piece of apparatus must go to the inspection so that the company can remain in-service. A basic fee is currently charged and additional fees are applied when violations are found. This may lead to a failure to note violations.

Fees were last updated August 27, 2003. Fees should be reviewed annually and potentially updated bi-annually.

Other Funding Sources – In Long Beach, the port authority pays for the cost of the harbor inspection program. PF&R should consider negotiating with its harbor authority to pay for the fully loaded cost of the harbor master function. The harbor authority may want more support than is currently provided.

FPD should look for opportunities to provide prevention services to smaller communities and for opportunities to combine functions with other cities.

Recommendation 89: Evaluate the benefits of combining prevention training with another city's prevention training. The Fire Marshal in the City of Vancouver is the former Portland Fire Marshal, which could facilitate joint training. Video prevention training may be an avenue to explore. Besides looking for potential partnerships, the bureau may also want to explore the possibility of contracting with smaller surrounding communities to provide fire inspector and other prevention services.

PREVENTION WORKLOAD & PERFORMANCE MEASURES

The City of Portland has a long history of measuring performance and citizen satisfaction with government services. Portland is ahead of most cities in this regard.

PF&R collects workload or output data better than most prevention divisions. Data is collected in FIRES2000 on the amount of time spent by FPD and fire company inspectors performing inspections, traveling to inspections and preparing for inspections. This data is best practice. PF&R goes beyond others by also involving citizen focus groups in the development of the five-year strategic plan. These practices are excellent and should be continued.

Review of Performance Measures Reported in the Statistical Summary

Reports – While the raw data exists, the reporting and use of data to manage the prevention division can be improved. In 2003–2004, Statistical Summary annual report, much of the data reported is workload data and not performance data. The number of permit applications, inspections, and re-inspections performed, violations found and abated, and schools participating in Risk Watch are reported. Good trend workload data is presented for the code enforcement activity (inspections, re-inspections, violations found and violations abated), which show the number of violations found is starting to decrease. Performance data is reported on percentage of violations abated within 90 days. The best performance trend data reports the impact of the Juvenile Fire Setters Program on the number of child-set fires and deaths associated with these fires. This data shows a marked decrease in deaths attributed to juvenile firesetting from 16 in the first eight years of the program to 3 deaths in the last nine years. The Fire Investigation Unit arrests, clearances, and convictions data is also good data, but should be shown as clearance and conviction rates for performance indicators.

In the draft Statistical Summary for 2004-2005, data which measures performance is improved. Arson is reported by type of occupancy (residential, commercial, other structure, vehicle and all other. A marked decrease from 77 to 45 in the number of residential arson fires occurred between 2000-2001 and 2001-2002. In the future, a significant drop like this should be explained. There are also drops in the number of arson fires in vehicle year after year that should be explained. The all other arson category is too large to suggest corrective action.

Recommendation 90: Share performance data with the Core Leadership Team monthly and Portland Police Bureau.

In the draft Statistical Summary for 2004–2005, the number of inspections completed is depicted as a percentage of inspections scheduled. The percentage trend is up which is very good, but no explanation is made to explain the improvement. The percentage trend of violations abated within 90 days is graphically depicted which is very good, but again no explanation is offered. The number of structural fires occurring in inspectable and non-inspectable occupancies is shown for fiscal years 2001–2005. This data is excellent and shows a decrease of fires in inspectable occupancies in the past two fiscal years. This decrease may well be the result of the CFIP or in an increase in the frequency of inspections. An explanation for this decrease should be known.

Recommendation 91: Further analysis should be done on this data after every fire by assessing when the last inspection was performed on a structure where a fire occurs. ⁹³ The data should be reported by occupancy type. This data should be reviewed monthly by the Core Leadership Team.

Also in the draft Statistical Summary for 2004–2005, the total hours of station and public education time is reported, but this is not sufficient to determine performance. Pre-and post-test are not performed on any activities to determine the effectiveness of the activity. The population reached by each program should be expressed as a percentage of the total targeted population. For example, the number of at-risk adults reached by the at-risk adult program should be expressed as a percentage of the total at-risk adult population of Portland. Pre and post-test should be conducted before and after targeted education programs to measure the effectiveness of the program at meeting the programs learning objectives.

Consideration also should be given to reporting public education activities and populations reached by neighborhood. This will assist in evaluating if the efforts are being focused in the areas where most fires and accidents occur.

PF&R no longer tracks the number of schools using Risk Watch®. The program now is available by option and is augmented by school and community service site visitations. ⁹⁴ Pre and

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⁹³ Kevin Baum, Battalion Chief, City of Austin Fire Department, Unpublished Article, *Fire and Life Safety Inspections; the Ongoing Quest for Meaningful Performance Measurements, 2001*, pages 13 and 14.

 $^{^{94}}$ Portland Fire & Rescue, $Draft\ Statistical\ Summary\ 2004-2005,\ November\ 2005,\ page\ 28.$

post-test results from the Risk Watch® program are no longer analyzed and may not be performed. Public education staff should insure that pre and post-tests are still being administered and should analyze the results of the program.

Review of Performance Measures for PF&R Strategic Plan 2005–2010 –

Currently, objectives have been defined for each of the major services provided by PF&R. The FPD objective is to save lives and property by preventing fires and unintentional injury. The five-year strategic plan, describes the purposes of four of the major prevention functions. ⁹⁵

- "Public education programs target Portland's most vulnerable and least accessible populations, specifically children, the disabled, and the elderly."
- Plan Review "evaluates construction and development plans for compliance with fire and life safety codes."
- "Code enforcement inspectors identify and mitigate fire hazards in commercial buildings, multi-family housing of three or more units and marine-related operations."
- "Fire investigators save lives and property by determining the cause of fires, identifying arson situations, and helping to put dangerous criminals behind bars."

The most basic measures are trends in deaths, injuries, and dollar loss. Several of the goals established for the next five years can be accomplished, in part, by prevention activities. Prevention performance measures are needed to determine how well prevention is helping to meet these objectives. These performance measure suggestions can serve as guides to establish measures that can be used daily in the management and delivery of prevention services.

Goal 1 – "Keep the city safe from low frequency/high consequence events." ⁹⁶

- Performance measurements are the number of such incidents and the severity (dollar loss, casualties) from incidents that occur.
- Increased in percentage and the number of occupancies equipped with fire and life safety systems
 - Percent of residential occupancies equipped with working smoke detectors
 - Percent of residential occupancies equipped with fire sprinkler systems
 - Percent of high-risk structures with fire sprinkler system.
- Reduce the incidence of over-crowding in public venues

Goal 2 – "Maximize dispatch effectiveness" ⁹⁷

• A prevention related objective is to "Reduce false and good intent calls by 10%" 98

⁹⁵ Portland Fire & Rescue, Strategic Plan 2005-2010, A Five-Year Road Map for Excellence, page 8.

⁹⁶ IBID, page 25.

⁹⁷ Portland Fire & Rescue, Strategic Plan 2005-2010, A Five-Year Road Map for Excellence, page 27.

⁹⁸ IBID, page 27.

Recommendation 92: Develop a prevention education program aimed at 'making the right call'. This can reduce demand or the rate of increase of demand, and reduce need to add resources. As parts of this program:

- Establish criteria for false and good intent calls.
- Develop protocols for fire dispatchers and 911 call takers in how to identify these calls
- Train fire dispatchers and 911 call takers in identifying and reporting these calls
- Train the dispatch supervisors in quality assurance techniques to insure that calls are being consistently identified and reported by all dispatchers and call takers
- Measure these calls as a percent of total calls and possibly as a percent of population in thousands.

Goal 3 - "Improve Technology Use and System Implementation",99

Prevention related objectives are to:

"Promote and explore new technologies for training and education delivery" ¹⁰⁰

Prevention related strategies are to:

- "Identify and implement alternative methods to enter and utilize code enforcement and permit data in the field"101
- "Integrate permit processing with Tracking Review and Construction System (TRACS)/Fires2000."102
- "Establish performance measure tracking and reporting needs for all divisions." ¹⁰³

Recommendation 93: Re-institute the pilot-testing program for field inspection data collection.

Recommendation 94: Establish specific performance measures for all prevention functions. Many are suggested in this section.

Goal 4 - "Implement resource demand management and response strategies", 104

Prevention related objectives are to:

- "Reduce inappropriate or unnecessary requests for responses." Performance measures for this have been suggested above.
- "Inform fire companies of new or changed target hazards in the FMZ (such as new buildings, et cetera)." 106

¹⁰⁰ IBID, page 28.

⁹⁹ IBID, page 28.

¹⁰¹ IBID, page 29.

¹⁰² IBID, page 29.

¹⁰³ IBID, page 29.

¹⁰⁴ IBID, page 30.

¹⁰⁵ IBID, page 30.

Recommendation 95: Develop an automated method for comparing FPD inspectable property data to BBL property data. The bureau should also develop an automated method to update BBL with FPD data and visa versa.

Goal 8 – "External and internal customers experience consistent, timely, quality customer service from all levels of the organization." ¹⁰⁷

Customer experience and satisfaction with the consistency of CFIP and FPD inspections can be measured as part of the invoicing and payment processing for inspections (user survey). This can also be measured as part of overall citizen surveys.

Goal 9 – "Maintain a highly trained and educated workforce" ¹⁰⁸

Prevention related objectives are to: 109

- "...implement company-based training (led by officers and supervisors) on LF/HC events."
- "Implement a monthly station-based and section-based training program led by officers and supervisors."
- "Increase awareness and expertise of officers regarding arson."
- "Clarify and apply consistent criteria for promotions."

Many recommendations have been made throughout this report on prevention training for officers, moving the training and quality assurance responsibility to company officers for the CFIP and for making fire inspector certification a criteria for promotion to company officers. We also recommended that fire officers be certified in fire cause determination and in securing the fire scene.

This list of objectives is comprehensive, but not all-inclusive. It is intended to underscore that the prevention division has a role in helping to achieve many of the PF&R goals even when the goals are not specifically directed toward prevention. This also provides a beginning list of objectives for which prevention measures of performance should be developed.

Other Recommended Prevention Performance Measures – For each prevention objective, three types of measures may be developed:

- Output or workload measures describe the amount of work that is done.
- Efficiency measures evaluate the amount of work output per resource input.
- Effectiveness measures characterize how well a function or activity is being performed.

¹⁰⁶ IBID, page 30.

¹⁰⁷ IBID, page 35.

¹⁰⁸ IBID, page 37.

¹⁰⁹ IBID, page 38.

Additional examples of each type of these prevention measures besides these given above are presented below.

1. Output

- Number of building and fire protection system plans submitted
- Number of building and fire protection system plans approved
- Number of fire inspections performed
- Number of presentations made to

2. Efficiency Measures

- Number of inspections performed per inspector
- PF&R Fully Loaded Cost per inspection

3. Effectiveness Measures

- Estimated dollar value loss adjusted for inflation per population in thousands
- Percent of plans approved/rejected within the goal established for plan turnaround
- Percent of fire scenes secured before evidence was contaminated
- Deaths, injuries, and dollar loss per 1,000 population
- Citizen satisfaction with prevention services and reason for dissatisfaction

PERMITS: Permits are issued for new construction fire alarms, fire sprinklers and fixed systems. Permits are also issued for other high-risk activities such as public assemblies, use of explosives and agricultural burning. The number of permit applications received by type of permit is the only workload measure reported. Another measure to be considered is the dollar value of new construction can be used as a general indicator of the size of the projects.

PLANS REVIEW: No data is reported on plans reviewed. It could be assumed that a permit application is equivalent to a plan. The type of plan reviewed should be reported at the lowest level of detail as practical. For example, collect data on engineering site plans, fire alarms systems, fire sprinkler systems, fire hood systems, standpipe systems, etc.

- Start collecting performance data on plans reviews like other aspects of prevention.
 This can include workload data on the number of plans reviewed by type of plan should be collected and reported monthly and yearly for several years to identify trends. Data should be collected on initial plans review and re-submitted plans review by type of plan so that ultimately workload and performance standards can be set.
- The number of hours spent reviewing each type of plan should also be reported by type of plan. The ultimate goal is to assess the staffing requirements for plan reviewers to perform the anticipated workload (# of plans and average dollar amount per plan).
- Number of review hours / Number of plans (by type of plan and for all plans) = average hours of review time per plan. This can easily be converted into cost and

staffing requirements. We believe FIRES2000 can be used to collect and report this data.

By collecting both the amount of work (number of plans reviewed and average dollar amount per plan by type) and the amount of time required to review each type, management can evaluate the efficiency of the process and can evaluate the efficiency of each employee. Over time, performance standards or goals can be established as guidelines for each major activity.

The effectiveness of the plans review function can be measured by the following measures:

- Turnaround time = the number of days elapsed from receiving the plans until the time they were approved or rejected. These statistics should be collected and reported at a detail level by plan type so that over time changes and improvements can be understood and explained.
- Percentage of the plans that met the established turnaround goals.
- Average number of violations noted by type of plan and by the extent of the corrections. This measure needs quality assurance review to determine that a quality plan review is being performed. When this is assured, the lower the number of corrections noted, the more voluntary compliance is being achieved.
- Percentage of plans reviewed for quality assurance should be reported by plan type.

Plan review turnaround goals should be established for each type of plan reviewed. For example, site plans may take less time to review than fire sprinkler systems; therefore, a reasonable turnaround for site plans may be two to three days. Another consideration in establishing turnaround times is the time sensitive nature of the plan. For example, plans resubmitted for review may need very quick turnaround so the project can proceed while site plans may not be very time sensitive. The BDS should be involved in establishing the goals for turnaround effectiveness.

INSPECTION MEASURES (CONSTRUCTION & EXISTING CODE ENFORCEMENT): To evaluate the staffing needs for construction fire inspectors, the number of inspections could be estimated from the number of plans reviewed by type of plan. For example, site plans would require one on-site inspection with an estimated percentage requiring one re-inspection. The number and type of inspections can also be estimated by the number of fire system plans reviewed by type of plan (sprinkler, alarm, hoods, smoke control, etc.). Although this is rarely if ever done, estimating the potential number of new construction inspections could further be refined by analyzing building permit data and/or building plans review data. This would help anticipate the number of construction fire inspectors needed 6 months to 1 year out as fire permits usually lag building permits by a year or more.

Some fire plans might require several inspections that closely coincide with BDS inspections (e.g., plumbing rough-in & final, electrical final and occupancy permit, etc.).

FPD should work with BDS to establish a notification process for fire inspections when certain building, plumbing, mechanical and/or electrical inspections are requested. This provides better customer service because one inspection request could trigger multiple types of inspections.

Regardless of the type of inspections performed (construction or existing), the workload, effectiveness and efficiency performance measurements are similar. However, the inspections should not be combined for reporting purposes.

In order for this data to be useful in the day to day management of prevention inspection services, several definitions are needed. First, what constitutes a fire inspection? Is a fire inspection one inspection trip or several inspections required to obtain final approval? We think it should by the number of unique inspection trips. What type of inspection is it? Is it a construction in progress or existing structure inspection? Is the construction inspection for a sprinkler or standpipe system? If so, is it the underground, visual rough-in or hydrostatic test? Is it the initial inspection or a re-inspection? The amount of time needed to do an underground inspection is probably considerably less than a hydrostatic test, which may take two hours. The ultimate purpose of specifically defining the type of work done and the amount of time required to do the work is to establish standards of performance and/or to determine more efficient and effective ways to perform the inspections.

Recommendation 96: Workload data should be reported by type of inspection. Firstly, construction inspections should be reported separately from existing structure inspections. Secondly, various types of construction inspections should be reported at the detail level (e.g., sprinkler rough-in, sprinkler hydrostatic test observation, fire main underground, certificate of occupancy, etc.). Thirdly, inspections on existing buildings should be reported by occupancy classification of building (R-1 for apartment, etc.).

Workload data on the number of initial inspections and re-inspections by type of inspection should also be routinely gathered, reported monthly and yearly and analyzed over time. For example, fire sprinkler system rough-in inspection and re-inspection should be reported separately from the hydrostatic test.

The amount of time spent on each type of inspection or re-inspection (construction and existing structure) should be recorded with averages reported monthly, yearly, and over time.

Ideally, travel time is reported separately. PF&R is one of the few prevention divisions that routinely collect travel time and preparation time separately. This is excellent practice. Average travel time and average preparation time per inspection by inspection type is a good measure of efficiency as travel should be minimized and field time performing inspections should be maximized. A trade off in increased travel time is made when inspectors are assigned specialized types of inspections (hazardous material, tank, etc.) Often the efficiency with which a specialist can perform a specific inspection is greater than a general inspector. However, some inspections required a higher degree of specialization, so increased travel time is acceptable.

Workload standards do not exist for the number of inspections that should be performed per day per inspector.

Portland might establish an overall workload goal for the number of inspections to be done on a daily and yearly basis. Eventually, workload standards should be developed for each type of inspection. These goals can be adjusted as more data becomes available to more accurately set goals.

A very important effectiveness performance measure for inspections is the number of unique properties inspected as a percentage of the total number of properties in an occupancy classification. How many inspectable properties are there in each inspector's or fire company's area to inspect and what percentage of these inspections are accomplished within a specified time period (yearly, once every three years, etc.)? Portland's prevention division is ahead most fire prevention divisions because FIRES2000 maintains an inventory of 'inspectable' properties. An automated method exists to assign properties to FPD and fire companies for inspection base on inspection cycles. This is excellent practice.

Recommendation 97: As an existing inspection effectiveness measure, report the number of unique properties inspected within each occupancy type and the percentage of each occupancy type inspected each year. This measurement can be used to evaluate the comprehensiveness of the overall inspection effort, of fire companies, of FPD and of individual fire inspectors. Establish inspection priorities by occupancies types so that the highest risk properties or the occupancies in which the greatest number of fires occur are inspected more often.

Effectiveness measures of inspection services have at least two aspects: how fast is the response to a request and how good is the quality of the inspection? Rarely are these aspects measured, but we recommend considering the following approaches and measures:

- Response time for requested inspections by inspection type (e.g., construction inspections) is defined as the number of hours or days elapsed between the request and the actual inspection trip. This measure is primarily for construction inspections but might include others.
- Percentage of inspections by type of inspection that require one, two, and three reinspections before compliance is achieved. This is an indirect measure of the extent to
 which the fire code is widely understood and degree of voluntary compliance. The
 goal of fire code inspection is compliance not how many violations or citations can be
 issued.
- Percentage of inspections reviewed by supervisors that meet the quality standards
 established for that type of inspection. This measures how consistently the fire code is
 applied across time and individual inspectors.

Unfortunately, a measure such as the number of violations found is difficult to evaluate. Is it good to find more violations? The goal of prevention activities is to reduce the occurrences of fires and the loss of life and property due to fires. This is accomplished through both punitive

and educational efforts. The desired method is to obtain voluntary compliance but verify. When inspections on existing structures are done at more frequent intervals, it is expected that violations found would decline over time.

Public Education Fire & Safety Measures – FPD only reports total hours spent on public education programs by fire companies and FPD staffs. An additional measure to consider is:

• Number of people reached (in person; by media). The data should also be reported by who conducts and/or participates in the programs (FPD inspectors, fire companies, public educators, etc.).

There is good wide-spread involvement of fire stations in some public education programs such as station tours. In fiscal year 2004–2005, a total of 15,449 station aggregate staff hours were spent in station tours and other in-station activities. This equates to approximately 10 full-time fire inspectors. ¹¹⁰

Consideration should be given to having more structured station involvement in public education programs with measurable outcomes. This could include:

- Distributing safety literature to apartment buildings and businesses during fire inspections,
- Canvassing apartment complexes for working smoke detectors.
- Canvassing low-income neighborhoods for working smoke detectors and visible street numbers.
- Conducting fire extinguisher use training classes.

In the draft of the Statistical Summary 2004-2005, several programs are listed:

At-Risk Adult Program

Business/High Rise Program

Youth Education Program

Public Education

Juvenile Firesetter Program Public Education Administration

Public Information Program Safety Learning Center

Special Events Program Jeff Morris Fire & Life Safety Museum

The program is mainly targeted at groups of people. Programs might also be targeted at the top five occupancies in which structure fires occurred:¹¹¹

- Residential properties 75% of fires (557/738)
- Mercantile and business properties 7% of fires (51/738)
- Assembly properties 5% of fires (35/738)

 $^{^{110}}$ See Appendix B: Computation of Available Time for Productive Work in FMO. Approximately 1,600 hours per year is available work time for FMO inspectors. 15,449/1,600 = 9.6556 inspector.

¹¹¹ Portland Fire & Rescue, *Draft Statistical Summary* 2004-2005, November 2005, page 14.

- Educational properties 4% of fires (32/738)
- Manufacturing properties 3% of fires (25/738)

Recommendation 98: Public education efforts should be targeted to occupancies where the most fires occur.

Fire and safety public education is probably the most cost-effective aspect of fire protection and the most important way a fire department can improve safety and reduce future costs. ¹¹² This function is crucial in developing self-inspection programs for businesses, education programs for schools and elderly populations and other programs for tourists, workers, citizens speaking different languages, and etc. These programs leverage all the other efforts of the fire bureau (prevention, fire suppression, EMS, training, etc.).

TriData has done much research on measuring the effectiveness of prevention, especially public fire and injury education programs. We also have researched ideas for improving their effectiveness. TriData reports include: *Proving Public Education Works, Reaching the Hard to Reach*, and *Overcoming Barriers to Public Fire Education*. Copies are available by the U.S. Fire Administration and can be provided to the Fire Marshal. The effectiveness measurement concepts also are presented in a chapter on Evaluation Techniques for Fire and Life Safety Education in the NFPA 18th edition Fire Protection Handbook. The reports contain many recommendations and specific examples of successful programs, and explain how to measure performance of public education. We recommend that those measurement concepts be used to evaluate public education programs and to explain its shortcomings. The basic concept is to use a hierarchy of measures starting with outreach, then gain in knowledge, change in behaviors or environment, and, ultimately, the bottom line of fires, deaths, injuries, and dollar loss.

Fire Investigation Measures – It is essential that the fire bureau is able to generate accurate statistical information concerning fire activity. These measurements should be used to determine trends, evaluate caseloads, evaluate staffing requirements, and ensure proper utilization of resources. The output or workload data collected should include the total number of fire incidents, the number of fire incidents by type (structure and vehicle), the number of cases investigated by FIU, the number incendiary fires, the number of accidental fires, and the number of undetermined cause fires. The number of fire fatalities, the number of civilian and firefighter injuries should also be reported. The number of arrests should also be reported by adults and juveniles.

Measures of FIU efficiency could be the number of active cases being worked per investigator, the number and percent of causes determined by fire companies, the percent of fires for which FIU was called out.

¹¹² For those interested in why public education is low in priority, see P. S. Schaenman, *Overcoming Barriers to Public Fire Education*. TriData Corporation, 1987.

- Number of active cases per investigator.
- Percentage of fire causes determined by fire companies and FIU.

As previously discussed, the primary effectiveness measure is the arson clearance rate and the clearance rate for juveniles involved in firesetting. However, the number of cases turned over for prosecution as a percentage of those actually prosecuted and those convicted is a good effectiveness measure of the entire process.

- Adult and juvenile clearance rates.
- Percentage of cases turned over for prosecution.

Some departments also analyze the Uniform Crime Report (UCR). The Federal Bureau of Investigations (FBI) develops the criteria for the UCR and statistics are collected from police departments across the nation. The arson statistics collected by the police department are stored and reported independently of fire bureau numbers. The FBI defines arson as "any willful or malicious burning or attempting to burn, with or without intent to defraud, a dwelling, house, public building, motor vehicle or aircraft, personal property of another, etc. Only when fires determined through investigation to have been willfully or maliciously set are classified as arsons. Fires of suspicious or unknown origins are excluded." Both fire and police departments use different coding systems in order to report incidents specific to their organization's primary mission.