JOB DEMANDS ANALYSIS

Company: City of Richmond **Location:** Firehall

Job Title: Firefighter **Classification:** Regular Duty

Position Overview

Firefighting can be some of the most physically and psychologically intense work in the world. There are long periods of time spent at the fire hall at low levels of day to day activity, broken up by intense training exercises and a number of unknown calls with variable demands requiring the member to operate in all weather conditions and be exposed to myriad risks.

Purpose of Activities

The purpose of the Firefighter position is to respond to emergency situations and take steps to protect life and property from damage or loss.

Tools and Equipment

The Firefighter will use the following tools and equipment to perform their duties:

1. While completing all of the fire operations, search and rescue, MVA and medical calls the Firefighter will most likely wear full turn out gear (helmet, coat, hitch and boots) which together may weigh up to 22 kilograms. If the Firefighter is required to mask up, he/she will add another 18 kilograms to his/her body weight. This weight is “inactive baggage” that serves to overload the already highly taxed structural and metabolic facilities of the human body. The necessary insulating qualities of the turnout gear increase heating close to the body. The equipment also presents difficulties with ease of movement and visibility.
2. Variety of sizes and lengths of hose (charged and uncharged).
3. Axes, pike poles, chainsaws, pumps, fans and generators.
4. Hematro spreader (Jaws of Life).
5. Variety of ladders (some aluminum, most wood).
6. Oxygen cylinder.
7. Radio and CAD computer (in truck).

Usual Methods

When an alarm has been called, the Driver of the Fire Rescue and the Lieutenant take their positions in the cab of the Fire Rescue. The Driver then proceeds to drive the Fire Rescue to the location of the call. The Driver of
the Fire Rescue must drive in all weather conditions, on major roadways and residential streets and in all types of traffic conditions.

Fire Calls

The Fire Rescue responds to fire calls primarily to support the Firefighters and equipment (Pump, Aerial, Tanker) already at the scene. On route to the call, the Driver and Lieutenant will most likely have received instructions, via 2-way radio, from the Captain on the scene or Fire Ground Command (FGC) to begin a specific task upon arrival.

In a life hazard incident, the Driver and Lieutenant of the Fire Rescue will mask up and enter the fire for primary or secondary search and rescue. When entering the fire the Driver will wear full turn out gear (hitch, coat, helmet and gloves) and mask. The turn out gear and mask will add an additional 41 kilograms to the Drivers body weight. They will follow the Fire Attack Crew into the structure to remove victims from the fire. If no life hazard is evident, the Driver may be assigned any one of the following tasks: Ventilation, open a roof or set up fans; set up lights at the scene; supply tools and equipment as required, chain saws, K-12, power tools; supply and change oxygen tanks as they are emptied; or control the utilities at the scene, water, gas, electric.

Once the fire has been knocked down the Driver and Lieutenant will remain at the scene to assist with salvage and overhaul. When the Fire Rescue returns to the Fire Hall, the Driver and Lieutenant will service and inspect the tools and equipment on the rig to ensure they are in working order so the Fire Rescue can be placed back in service.

Motor Vehicle Accidents

If the MVA call is in the district the Fire Rescue will respond following the Pump. If the call is outside the district the Fire Rescue will respond without the Pump. Crews from other stations will already be on scene when the Fire Rescue arrives. The Driver will

try to spot the Fire Rescue in a position that will allow the Firefighters to use the hydraulic equipment. The hoses on the hydraulic equipment are typically 100 feet in length. The Drivers main function is to set up and ensure the appropriate tools and equipment (hand tools, power tools, chain saw, Spreader, K-12, blocks for stabilization, Vetter bags, rope, etc.) are ready for use by the crews on scene. The Driver will also operate the tools and equipment if the Firefighters at the scene are not familiar with their operation. The Driver will also complete tasks as they are assigned by the Captain.

Medical Rescue

The Fire Rescue responds to medical rescue situations. A medical rescue situation may involve extricating injured victims from an industrial accident, MVA, train wreck, etc. A large number of these calls may be purely medical in nature, so the role of the firefighter is that of first responder. The ambulances are dispatched on a separate system and often the firefighter will arrive at the scene behind the ambulance. If the ambulance attendants don't require the assistance of fire, the firefighters are released from the scene. These calls can occur in residences, in vehicles and on the sidewalks and roadways. In the downtown region, many of these calls will be unknown collapses, seizures, drug or alcohol related and occasionally as a result of a shooting or stabbing. The Driver's primary role in this situation is to set up and ready the tools and equipment required to carry out the rescue. The Driver is also another source of manpower at the scene.

The Fire Rescue is equipped with a water vac, sump pump and squeegees and will respond to flood calls at a private residence or business. The Driver will take an active role in the clean up.

General Fire Fighter Duties

The following is a list of tasks that are commonly experienced during fire fighting:

1. Carrying equipment up and down stairs in buildings
2. Advancing charged hoses (240 pounds of nozzle thrust)
3. Breaking down doors, walls ceilings and roofs possibly using the following equipment: chain saw, hack saw, K-12 saw, sledge hammer,
4. Working over head with a pike pole or hoses
5. Raising ladders
6. Rescuing victims
7. Raising and lowering equipment or victims from building/high-rise windows via ropes

8. Automobile extrication
9. Carrying equipment long distances from the truck to the fire site.
10. Hanging and rolling hose in hall.
11. Cleaning equipment in the hall.
12. Mock fire drills on a weekly basis.

The following are tasks that have been identified as physically demanding

1. High-rise fires:
    - moving equipment such as fans, rescue gear, axes, pike poles, K-12 saw, hand tools and high-rise packs to the fire floor wearing full turn out gear
    - moving additional equipment (tools, air tanks, etc.) to the staging area immediately below the fire floor

2. Ventilation and overhaul procedures:
    - breaking through a roof while on a ladder or a pitched roof using axes, chain saws, hand saws
    - using a pike pole to pull down a ceiling

3. Hose laying operations:
    - dragging a charged hose through a fire site, both inside (hallways/stairways) and outside (obstacles/icy conditions)
    - directing a charged hose for an extended period of time
    - laying hose from fire site to from a distant hydrant

4. Ladder work:
    - rescuing a victim from a roof or window using ladder
    - raising a ladder
    - using an ax while on a ladder

5. Forcible entry:
    - entry through steel security doors using hand tools such as axes, sledge hammers, chain saw, hand saws, K-12 saw
    - using hand tools and power equipment to open a wall

6. Extrication:
    - using hand and power tools such as hack saws, pry bars, wedges, air chisel, glass cutter in confined areas to extricate victims

- using heavy tools and equipment such as a cutter and spreader in automobile extrication
- moving victims from a damaged automobile or collapsed buildings
- moving and salvaging furniture

7. Extended Procedures
   - fighting fire for extended time periods and conducting lengthy extrication procedures (automobile pileups, industrial fires, train derailments)

The following is a list of factors that will increase the difficulty of the physical demands that are required in a firefighting operation:

8. Fighting fires in older buildings involves heavier construction materials, plaster/lathing, and plank construction in walls, ceilings and roof, which result in :
   - working over head for extended periods of time during ventilation, salvage and overhaul
   - more rapid spread of fires
   - higher fire temperature, leading to increased fatigue
   - firefighting tasks must be completed more rapidly

9. Work in high-rise buildings:
   - includes climbing several flights of stairs carrying equipment
   - often involves concrete construction and toxic materials
   - more intense, long term heat due to concrete construction which absorbs, then radiates heat even after the fire is under control
   - ventilating procedures that require removing heavy windows or opening concrete walls

10. Standard clothing and SCBA equipment:
    - restricts movement
    - added weight of SCBA and breathing apparatus and increased respiratory effort
    - not appropriate for all rescue and fire fighting situations (extreme hot or cold weather)

11. Equipment used in fire fighting is often heavy:
    - frequent use of power tools in awkward positions
    - use of hand and power tools held in front of the body for extended periods
    - equipment used to free victim from entrapment is very heavy

12. Environmental conditions at fire scene can add to difficulty:
    - deteriorating conditions at fire site (particularly in Winter as water freezes)
    - repeated exit and entry from fire site in Winter, resulting a large fluctuations in body temperature
    - garbage and furniture at the fire site that impedes movement

13. There is an increase carrying of equipment when access to the fire site is difficult (fences, gates, overhead wires)

14. Darkness and smoke decrease visibility, increasing the difficulty of search and fire fighting procedures (Gledhill and Jamnik, 1992, p.209-210)

The nature of firefighting is such that there are periods of complete inactivity mixed with periods of physical and mental preparation (actual calls and false alarms) and periods of moderate to intense physical work. The frequency of calls (requiring preparation and possibly work) and duration of work episodes will vary considerably from shift to shift and from station to station. The Firefighter must, however, be prepared at all times for the most demanding of situations as they may arise at any moment.

Administrative Issues

As a firefighter, an individual will rotate between Hydrant Man, Driver of the Pumper, Fire Rescue, Aerial and Tanker Trucks on a regular basis. As a result, the Firefighters tasks and responsibilities will vary. Likewise, the demands on the Firefighter, physical, emotional and mental will vary as well. They may work at any one of five firehalls in the Richmond area as well as the airport. The demands vary from hall to hall with number one hall generally being the busiest.

Training is carried out, often simulating emergency conditions, once out of every four day shift rotation.

Firefighters will work 10-hour day shifts (7:00 AM - 5:00 PM) and 14-hour night shifts (5:00 PM to 7:00 AM). The Firefighter will work a rotation of two days, two nights followed by four days off. Generally overtime is not required, however, if a call comes late in a shift overtime may be necessary.

Activity Demand Variables

These variables are tasks that must be carried out by the employee and are implicitly or explicitly required as objectives of the job.

- Respond to alarms at any time of day or night.
- Work in any environmental conditions.
- Manage and deal with emergency situations.
- Use radio system.
- Wear heavy turnout gear.
- Respond to medical and fire situations.

Worker Decision Variables

These variables are the sub-routines and cognitive/physical decisions made by the worker in carrying out the objectives of the job.

- Limited choice of postures for carrying out duties.
- Technique for dealing with situations in the field.
- Timing of breaks and rotation of positions.
- Some control over timing and extent of conversation with others.

Accommodative Considerations

- People who are not in peak physical condition and capable of passing an assessment of physical firefighting tasks should not be considered for this position.
- Individuals with heart disease or high blood pressure would be at increased risk due to high levels of exertion, emotional stress and thermoregulatory stress.
- Individuals who do not cope under intense pressure or in open low-autonomy work environments would have difficulty with this position.
- There is a significant learning and training curve associated with this work.

Prepared By: Greg Hart, Kinesiologist July 5, 2001

Summary of Stresses

Metabolic Stresses

The literature suggests that 90% of firefighting operations investigated by Gledhill and Jamnik in 1992 required a mean maximal oxygen uptake (V02max) of 23.4 ml/kg/min and this intensity could be sustained for 1-2 hours and generally corresponds to 50% of V02max. Performance of the most demanding firefighter operation (10% of operations) requires a mean V02 of 41.5 ml/kg/min. Due to the restrictions imposed by the SCBA, the maximum duration that these activities during fires should be limited to 10 minutes. The V02max required to support this intensity is 47.4 ml/kg/min.

The primary energy system that will be utilized during firefighting operation is the aerobic energy system. However, there will be frequent periods of activity during fire operations that will require the production of energy from the anaerobic energy system (lifting, carrying, climbing stairs in full turn out gear with hi rise belt and hose, operating extrication equipment, etc.). Development of the aerobic energy system will aid in the recovery from anaerobic activities required during fire fighting operations operation. There will be continuous demand on the aerobic energy system as well as frequent bouts of varying duration and percentages of active tissue involving the anaerobic energy system. This can include (especially in a rescue situation) sustained work of several minutes at maximal outputs while wearing full equipment and SCBA. Anaerobic Capacity is a significant factor in these instances as well as Aerobic Power.

Heat stress associated with wearing he turnout gear can drive metabolic activity as the cardiovascular system attempts to assist in cooling the body. Near maximal heart rates were measured in several subjects while standing still on a warm day in full gear. Their heart rates did not rise appreciably from these already high levels during intense ladder evolution drills. This represents severe cardiac stress.

STRUCTURAL STRESSES

The primary cause of musculoskeletal stress the Firefighter will encounter are a) lifting heavy objects from the ground to relocate them, b) lifting heavy objects to and from shoulder/chest height, c) holding heavy objects for extended periods of time or repeatedly manipulating these objects at waist to shoulder height, d) pulling heavy object using the arms and e) dragging heavy objects such as hoses. Often these tasks are performed under adverse conditions where the Firefighter is completing the task from a position of weakness rather than from a position of strength. Conditions may prevent the Firefighter from using correct form and technique. Injuries can include the possibility of burns, blunt and sharp trauma to any part of the body. The more insidious risk of injury is presented by the time spent waiting for calls.

Firefighting requires unmeasurable contributions from the entire body and there are extreme stresses placed on nearly every element of human function.

Cardiovascular

Due to the increased weight of equipment, exposure to extreme heat (dehydration), sporadic nature of the work and emotional strain, firefighting places extreme stresses on all elements of the body's cardiovascular system including the heart muscle itself. Dehydration, hormonal stimulation and high cardiac outputs place high-energy requirements on the heart and subsequently its blood supply efficiency.

Spine

The Fire Fighters spine is at major risk for injury due to the extreme conditions in which he/she must work. In the winter, the Fire Fighter is extremely vulnerable to slip and fall spinal injuries due to snow and ice build up resulting from the weather or water that freezes at the scene of a fire call. Low friction surfaces decrease the body's ability to transfer force from the hips and legs and increase the active loading of the torso and spine.

The spine will also be taxed during the many dynamic and extreme movements required during a call. Because of the many limitations present in the external environment, forces must be regularly handled by the torso as in the example of being on a ladder and having to keep the body on the ladder and move well to the left or right to swing an ax or assist a victim. This can result in disc compression that significantly exceeds the thresholds of the tissue, especially when the movements involve lateral bending and axial twisting. A good deal of firefighting involves the arms being used away from the body or overhead. These positions further tax the torso and spine as it results in significantly elevated leverage penalties because of the distance of loading away from the torso.

An additional concern is related to the long periods of inactivity that can characterize firefighter work when they are not involved in a call. These habits will decrease strength and flexibility. If the postures include considerable sitting, spinal ligament creep will also lead to lower stability in the spine. Cady et. Al. (1979) suggests there is a strong correlation between lack of physical fitness and increased incidence of low back injury. Their study concluded that physical fitness and conditioning are preventive of back injuries. They found the least fit Firefighter was most likely to suffer a back injury while the most fit was less likely to suffer a back injury. These injuries

can include the disc, ligament, bony and muscular structures of the spine. They can occur in a moment of significant overload, a fall or from repeated insult over time.

Shoulders, Arms, Hands and Fingers

The upper body will be significantly stressed from the frequency, intensity and duration of activities that are required during a call. The fire operations activities are described above. A considerable amount of firefighter work is carried out with the arms flexed or abducted and even overhead. This position often involves high force performance and can be sustained over at least several minutes. These activities place significant stress on normal shoulder mechanics and all the structures in the upper quadrant regions, especially the rotator cuff muscles and the articulation between the head of the humerus, the clavicle and the scapula. Sustained grip activities of varying dimension are a common factor in firefighting. This can include hoses, special equipment and tools. These grips are normally through heavy gloves and in wet conditions. These factors significantly increase grip requirements. The elbow also takes considerable stress due to high force (i.e. tool work) in postures where it is difficult to use the full kinetic chain of the body to develop force, therefore overloading the forearm and elbow structures.

Hips, Knees and Ankles

The Firefighter will also find that the lower body is also significantly stressed with the activities associated with the fire operations call. The Firefighter may find him/herself walking, running, climbing, crawling, crouching, kneeling, bending, balancing and stooping during the course of one call. These tasks are often performed on unstable terrain (snow, ice, mud, water, gravel, ladders, vehicles, ditches, roofs, etc.) and in adverse conditions. Pivoting movements, characterized by restricted foot placement, increase stress to knee cartilage as well as ankle and knee ligaments, especially in light of the significant increase in weight carried in the extra equipment. There can be considerable direct contact pressure to the knee area when conducting searches or leaning against ladders. Most stresses in the lower portion of the body are transmitted through the knees due to the restrictive nature of the footwear that does not accommodate large movements in the ankle and foot.

The muscles about the hip joint are required to generate large forces in lifting, climbing and stabilizing body positions. They must be able to tolerate rapid changes in length including abduction.

INTERVENTIONS

Recommendations that could be implemented to lessen the risk of injury are listed below:

1. Consider job specific fitness standards that must be successfully completed at least once per year for duration of the Firefighters' career. These standards, as identified by Gledhill and Jamnik (1992) must be a)commonly encountered and essential tasks, b) customarily performed under emergency conditions (during a fire or search and rescue), and c)normally conducted by a single Firefighter. This testing should also include measurable evaluation of the basic physiological capabilities stressed in firefighting including heart/lung functions, metabolic fitness (aerobic/anaerobic), muscle strength, muscle power, muscle endurance, flexibility and active joint/trunk stability

2. Encourage the Firefighter to be physically active away from and at the Fire Hall. The Firefighter should focus on physical activities that will increase aerobic/anaerobic power and capacity, muscular strength and endurance of both upper and lower body, and range of motion of the shoulders, back, arms, hips, groin, quadriceps and hamstring. The Firefighter should definitely focus on activities that improve dynamic trunk and torso stability.

3. Encourage the Firefighter to perform regular warm up exercises (7-15 minutes in duration) after long periods (one hour) of inactivity at the Fire Hall. This will help the Firefighter stay warm and ready for action throughout the shift and decrease the likely hood that he/she will go to a call cold. It will also help to insure that the creep has been taken out of the spinal ligaments before that structure is engaged in aggressive activity. The warm up activities could involve walking around the Fire Hall and apparatus floor, walking up and down stairs at the Fire Hall, riding a stationary bicycle (non-seated activities would be best) or stepping on a stair climber and performing static stretches to help keep the body and working muscles warm.

4. Provide regular-training activities targeted at educating and practicing creative movement strategies to best deal with the unmanageable external environment encountered in their occupation. This will assist them in developing work habits that keep injury risk as low as possible in any situation, regardless of its ergonomic suitability.

5. Encourage the Firefighter to stay properly hydrated while on shift. This will include drinking suitable amounts of water throughout the day and avoiding any beverages that are caffeinated (coffee, tea, pop and carbonated drinks). Caffeine is a diuretic and will cause the body to lose water and the Firefighter will become dehydrated at a much quicker rate in the event of a physically demanding call. **DO NOT INGEST SALT TABLETS TO REPLACE SALT LOST THROUGH SWEATING**. There is enough salt in the average Firefighters diet to replace the salt lost through even the mostly physically demanding call.

   Effects of Dehydration
   1. Reduction in muscular strength
   2. Decrease in work performance
   3. Lower plasma and blood volumes (increased cardiac effort)
   4. Reduction in cardiac functions during submaximal work conditions
   5. Lower oxygen consumption
   6. Impairment of thermoregulatory process
   7. A decrease in renal blood flow and the volume of fluid being filtered by the kidney
   8. A depletion of liver glycogen stores
   9. An increase in the amount of electrolytes being lost from the body

(Bowers and Fox, 1992, p.348-349)

6. Implement a process for reviewing commonly utilized processes and equipment to identify ergonomic risk. Incorporate ergonomic risk awareness in all training activities.

7. At MVA scenes where glass has been broken, have a firefighter sweep the glass under the vehicle so that there is a reduced chance of slipping and an increased efficiency of mechanical work for the firefighters.

References

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Cady, L.D, Bischoff, D.P., O'Connell, E.R., Thomas, P.C. & Allan, J.H. (1979) Strength and fitness and subsequent back injuries in firefighters. Journal of Occupational Medicine, (21), 4, 269-273.

Gledhill, N. & Jamnik, V.K. (1992) Characterization of the physical demands of firefighting. Canadian Journal of Sport Sciences,(17), 3, 207-213.

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Referral: Robb Armstrong		Organization: City of Richmond							Title: Firefighter
Dept.: Fire		Division: Station #1							Contact: Deputy Chief
				FREQUENCY*					Date: July 5, 2001
	PHYSICAL DEMANDS	REQD	SIDE	Sel 1	Low 2	Mod 3	High 4	Max. Weight (kg)	Usual Weight (kg)	COMMENTS
STRENGTH	Lifting - Floor to Knuckle		B		X			67	25	tools, equipment, victims, stretcher
	Lifting - Knuckle to Waist		B		X			67	25	lifting from trucks, stretcher
	Lifting - Waist to Shoulder		B			X		45	25	equipment, hoses, extrication operation
	Lifting - Over Head		B		X			32	10	equipment, ladders to/from truck
	Carrying - With Handles		E			X		67	25	med. kit, spreaders, fans, chainsaws, pumps
	Carrying - Without Handles		B			X		50	25	hose, tools , equipment, victims to 50m
	Pushing - Upper Extremity		E		X			125	20	doors, wrenches, materials in extrication
	Pushing - Hip/Leg Assist		E			X		125	20	charged hose, control hose, walls down
	Pulling - Upper Extremity		B		X			125	20	lengths of uncharged hose/ wrench on hydrant
	Pulling - Hip/Leg Assist		B			X		125	50	charged hose, wrenches, ceilings and doors
	Reach - Shoulder or Above		B			X		32	20	use pike pole or axe on ceiling or from ladder
	Reach - Sho. or Above extnd		B		X			32	20	use pike pole or axe on ceiling or from ladder
	Reach - Below Shoulder		B			X		125	25	attach hoses, use extrication tools
	Reach - Bel. Shoulder extnd		B		X			125	25	attach hoses, use extrication tools
	Handling		B				X	125	20	tools, equip., medical supplies and equip.
	Gripping		B				X	125	20	tools, equip., victims, other fire fighters
	Fine Finger Movements		B		X			max.	max.	coupling/uncoupling hoses,tools and equip.
ENRG	Aerobic (percent)						60	sustain heavy work(45ml/kg/min), recovery, duties at hall		
	Anaerobic (percent)				40			sprint, jump, heavy short term exertion (lift, pull, etc.)		
	High Energy Expenditure						X	ladder carry/climb, fire suppression, MVA extrication, drills		
	Low Energy Expenditure						X	duties in fire hall, during non life threatening calls		
POSTURE+MOBILITY	Neck - Static Flexion					X		work below shldrs at fire, MVA and med. calls and in fire hall		
	Neck - Static Neutral						X	walking, sitting, standing at all calls and in the fire hall		
	Neck - Static Extension					X		looking up during fire, hanging/taking down hoses		
	Neck - Rotation		B		X			during fire, MVA and medi. calls, general duties around fire hall		
	Throwing				X			rolling out hose at scene or in hall		
	Sitting						X	in truck responding to a call (<10 min.), at fire hall		
	Standing						X	at call (can be sustained), in fire hall		
	Walking					X		at fire hall , responding to calls, general duties		
	Running/Jumping				X			jump from pole, run to vehicles, response to fire scene		
	Climbing - Arms and Legs				X			up ladders at calls		
	Climbing - Legs Only				X			up stairs in buildings, in certain types of calls and rescues		
	Bending/Stooping				X			assist collapsed victims, roll hoses in hall, couple hoses		
	Crouching				X			assist collapsed victims, roll hoses in hall, couple hoses		
	Kneeling				X			to assist collapsed victims, roll up hoses in hall		
	Crawling				X			in confined spaces at a fire or in an MVA medical situation		
	Twisting		B			X		in any awkward locations (fire or medical)		
	Balancing					X		fire, MVA/medical calls, duties on the boat (if applic.)		
GEN	Traveling				X			to all calls in city via truck or possibly boat		
	Work Alone									
	Interact with Public				X			at calls, bystanders, fire hall tours, as a driver		
	Operate Equip/Machinery						X	hydrant, hoses, fans, rescue equipment, medical equipment		
	Irregular/Extended Hours						X	Two -10 hour days, Two -14 hour nights (4 on/4 off)		

* Frequency Legend 1 = Seldom; Not Daily 2 = Low Daily Activity; < 1hr
3 = Moderate Demand; Repetition 1 - 3 hrs daily 4 = High Frequency Demand; Repetition > 3 hrs daily

The following shading denotes a HIGH RISK TASK: Controls should be considered

REQD is marked if the particular demand or category is relevant to the purpose of the job.

SIDE refers to the side or limb required to execute a task. If it is marked **E**, it indicates either side, the most common choice is listed first. **D** refers to dominant and **B** to both sides.

Referral:		Organization:						Title: see 1st page header
Dept.:		Division:						Contact:
				FREQUENCY*				Date:
	PHYSICAL DEMANDS	REQD	SIDE	Sel. 1	Low 2	Mod. 3	High 4	COMMENTS
PERCEPTION	Hearing - Conversations		B				X	communicate with superiors, captain, lieut., crew and others
	Hearing - Other Sounds		B				X	alarm, vehicles, fire, escaping gas
	Vision - Far		B				X	responding to all calls, fire, MVA and medical, duties at fire hall
	Vision - Near		B			X		examining patients, check alarm panel, check equipment
	Vision - Colour		B		X			assess victims during rescue/extrication, recognize flame
	Vision - Depth		B		X			judging distances and movement of fire or traffic
	Perception - Spatial		B		X			moving around dangerous objects, moving in crowds
	Perception - Form		B		X			discern tools + hose couplings, examine patient/materials
	Feeling (Tactile)		B		X			for heat on doors, wounds on patients, pulses
	Reading				X			maps, manuals
	Writing				X			brief call reports
	Speech						X	communicate with colleagues, patient, other agencies, public
WORK ENVIRONMENT	Inside Work						X	medical calls, in structures, in hall, in enclosed truck
	Outside Work						X	fires, MVA, medical calls, old trucks not enclosed
	Hot Conditions >25 deg. C						X	severe in fires, Summer, Spring and Fall
	Cold Conditions <10 deg.C			X				in Winter, Fall and Spring, depends on location of call
	Humid			X				depending on weather and call conditions
	Dust					X		possibly at fire, MVA or medical call
	Vapor Fumes						X	fire, unknown toxins and chemicals, smoke, chlorine gas
	Hazardous Machines						X	trucks, charged hose, chainsaw, pumps, axe
	Proximity to Moving Object						X	in truck responding to call, at call in traffic
	Noise						X	siren, vehicle noise, fire, ambient location noise
	Electrical Hazard				X			possibly during fire, MVA or medical calls
	Sharp Tools				X			axe, blades, pike poles, chainsaw, twisted metal, nails
	Radiant/Thermal Energy						X	fire, sun, hot motors, through windshield, off vehicles/buildings
	Slippery Conditions						X	water, mud, ice, foam on different surfaces
	Vibration and Related					X		operate tools and equipment, saws, spreaders, cutting devices
	Chemical Irritants				X			cleaning solutions, variety of noxious substances on calls
	Organic Substances				X			human vomit, feces, rotting food, bodies or other material
	Medical Waste			X				syringes, bandages, colostomy bags during medical calls
	Blood Products				X			during MVA, medical calls from injured patients
	Congested Worksite					X		in fires, awkward medical calls and vehicle extrications
	Lighting - Direct						X	the fire, sun light, in bldg with fluorescent/incandescent light
	Lighting - Indirect						X	at fire, medical and MVA calls
PSYC	Consequences of Error						X	High, ranging from property damage to injury and loss of life
	Competence Challenge						X	Unique conditions in every situation, new techniques/equip.
	Autonomy					X		Local in task execution, must take orders
	Relatedness						X	Live with co-workers, lives depend on teamwork

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For detailed descriptions of each of the different categories, please refer to the reference guide or inquire with Human Effort at 1-888-4EFFORT