

The Oklahoma Smoke Diver Nutrition Guide



**Oklahoma Smoke Diver
Association**

www.Oklahomasmokediver.com

Preface

Oklahoma Smoke Diver training is very different from your typical firefighter training. The intense drills are completed after a grueling physical training regiment. This requires you to maintain your critical decision-making skills, motor skills and your situational awareness while under extreme physical and mental stress.

The physical training held each day is not designed to get you in shape; you should already be highly physically fit. It is designed to wear you down so that simple tasks become increasingly difficult to accomplish. Most drills could be accomplished very easily by any firefighter if performed independently, but Smoke Diver training is designed to simulate the worst-case scenario and teach you how to maintain your edge and your ability to perform under these conditions.

Over the years the attrition rate of the course has ranged from 30% to 75%. Most of those who drop out on request did not adequately prepare for the class either physically or mentally. Others experience medical problems mostly related to nutritional deficiencies. There is very limited information on firefighter nutritional needs, for that reason we have researched the nutritional requirements of athletes and some of the most rigorous military training programs for information.

It is our intent to educate you on the important role that nutrition plays in your ability to perform during the demanding Oklahoma Smoke Diver course. We also hope to provide you with guidance that will assist you in not only completing this training, but give you the ability to perform during long operational periods, deployment to disaster areas and to help you maintain a healthy lifestyle.

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Energy Balance

Your energy balance is simply the intake of the same amount of energy that you are expending (putting back in what you are taking out.) During times of limited activity, it is very easy to calculate what you need to take in to sustain yourself. However, during periods of high physical activity it is more difficult, like during Smoke Diver training. The easiest way to monitor this is by checking your weight regularly. Generally, if you are putting in what you are burning up then you will remain at the same weight. However, if you begin to lose weight then you are not keeping an energy balance and your performance will quickly begin to suffer. Once this occurs it is more difficult for you both physically and mentally to continue the training.

The unit used to measure energy intake is an expenditure of the Calorie. The amount of Calories you intake vs. the amount you expend determine your weight gain or loss. For example if your energy input is 2000 Calories per day and you expend only 1800 Calories per day you have over eaten by 200 Calories. If you do this everyday for a year you would gain weight:

200 Calories x 365 = 73,000 extra Calories per year

Or

20 extra pounds per year

The reverse is also true. If you expended 200 more Calories than you took in you would lose 20 pounds.

Note: To gain or lose 1 pound it takes approximately 3500 Calories consumed or burned.

What Are the Components of Your Energy Expenditure?

Before you can determine your nutritional needs and comprise your Smoke Diver nutritional plan you must understand the major contributors that affect your energy expenditure. They are as follows:

- ✓ Resting energy expenditure
- ✓ Physical activity
- ✓ Energy for digesting foods



In order to determine your energy balance you must determine your Resting Energy Expenditure (REE). This is simply the amount of energy required to maintain life in your current status.

Determining (REE) of Men From Body Weight

AGE Years	Equation to Derive REE Calories/day
18-30	6.95 x weight + 679
30-60	5.27 x weight + 879

Total Energy Expenditure

Estimating Total Daily Energy Need at Various Training Levels

Level of Activity	Activity Factor (x REE)
Very Light – Classroom sessions, standing, driving, riding the bus, rehab	1.3
Light – Walking, registration, setting up gear, SCBA time drill, obstacle course walk through	1.6
Moderate – Carrying equipment, jogging, pool drills, PT without gear, emergency procedures practical	1.7
Heavy – Walking/Jogging in gear, running for time, obstacle course without gear, Denver drill, rope bailout, mass area search, maze drills, nuts & bolts, air consumption drill, barrel drill	2.1
Exceptional – Obstacle course with gear, 5 evolutions, search and rescue drills, cold smoke drill, FF up & down stairs	2.4

Example:

You are 25, weigh 170, and the activity level is heavy

REE= $6.95 \times 170 + 679 = 1860.5$ Calories per day

Total Energy Needs = $1860.5 \times 2.1 = 3907.5$ Calories per day

Your Total Daily Energy Needs

Weight _____ Age _____ Activity Factor _____
Determine Your REE: _____ Calories per day
Energy Needs = REE x Activity = _____ x _____
Your Estimated Energy Needs = _____ Calories per day

Body Mass Index

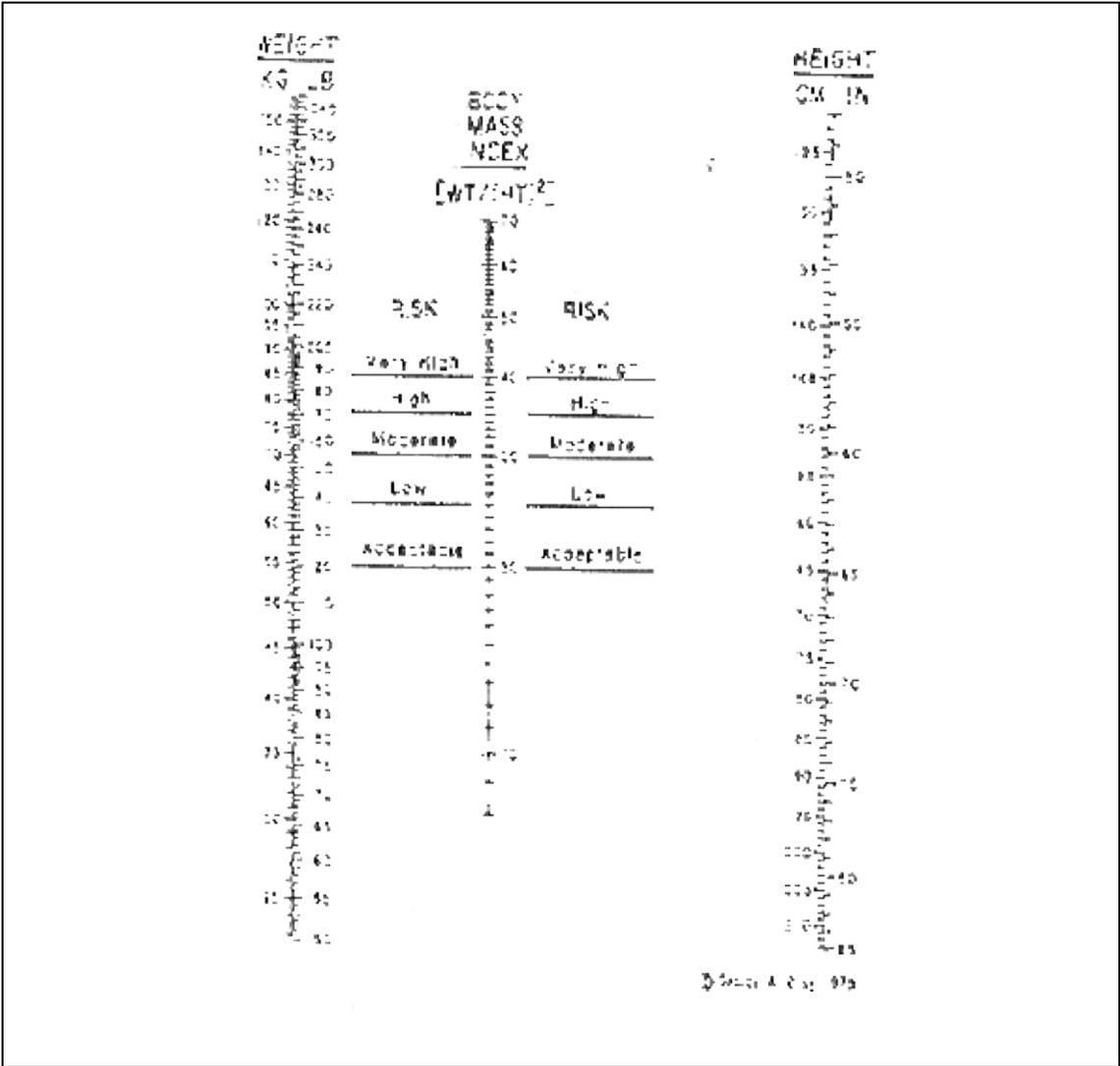
The Body Mass Index (BMI) is a quick assessment of your body composition in order to classify you as under or overweight. The ratio is $\text{weight} / \text{height}^2$. Although standards have been developed for the general United States population these standards do not apply for “special populations”. A Smoke Diver Candidate belongs to the special population which basically means that the type of activity encountered by the Smoke Diver Candidate is not the same level as the typical American. The Oklahoma Smoke Diver Association is in the process of collecting data on both Smoke Diver Candidates and Instructors to determine our own standard that can be used as a screening tool. The following BMI information is based solely on the United States Navy SEAL population and used as a reference for individuals to assess their body composition.

The average SEAL BMI was 25, and the average body fat was 13%. While these averages are currently unavailable for the Smoke Diver population, it is safe to assume that the BMI would be similar, given the physical demands for a short period of time.

A very small group (24) of Smoke Diver graduates from class 33 and 34 were surveyed. Their average BMI was 27 and average body fat was 20%.



Use the Nomogram on the following page to find your BMI and see where you are relative to the numbers given for the recent Smoke Diver graduates. To use this chart, place a straight edge between your height on the right side and your body weight on the left side; then read the BMI from the center scale. This chart is not 100% accurate in very large frame individuals. This chart, along with your body fat, will be a good indicator to determine if your physical condition is appropriate for Smoke Diver School.



Use a straight edge between your height on the right and your weight on the left. Where your line crosses the BMI line is your Body Mass Index.

How To Calculate Your Energy Expenditure

In order to plan your diet for your preparatory training and your week at Smoke Diver School you will need to calculate your energy expenditure for each activity over each 24-hour period. This includes accounting for every minute of the time period, whether you are tackling the obstacle course or sleeping, each has a certain energy expenditure that you must account for.

To accomplish this task please use the worksheet provided on the following page to calculate your energy expenditure.

How to use the worksheet:

- ✓ **Record your name and date on the form**
- ✓ **List all of the activities you participated in during the day's training**
- ✓ **Go through the list of activities provided in the Appendix and find each activity**
- ✓ **Write down the Calories per minute value in the appropriate column (Energy Value)**
- ✓ **Multiply the energy value by the total time in minutes. For example, if you ran in PT gear for 45 minutes, your energy expenditure for that activity would be 9 (energy value) x 45 = 405 Calories**
- ✓ **Do this for all the events during and away from class. Add the number up. You will be surprised by some of the numbers, but this should give you a good overview of energy balance. You should also keep track of your weight as a check to see if your calculations are right. If you are calculating right you should maintain your weight.**

Name		Date	
Activity	Time in Minutes	Energy Value Calories per minute	Total Calories
Drive to Academy	60		
Registration	30		
Written Test	30		
Physical Ability	30		
1.5 mile run	13		
Classroom	60		
GRAND TOTAL			

What Are You Eating?

Carbohydrates, Fat and Protein: The Energy Foods

It is said that America is facing an epidemic of obesity. Nutrition is something that is not readily taught as a subject in schools, yet studies show that obesity is affecting younger Americans. The fire service is not immune to the national trends, and although considered a special population, heart disease and cancer are much higher in firefighters than that of the general population.

This guide was developed to help you understand basic nutritional principles that will help you maximize your body's performance while training for and participating in Smoke Diver School, however the information will help you understand the energy balance and how to eat properly during both training and non-training times. You will also find added benefits in learning how to control your weight by balancing your energy intake.

In this section we will cover:

- ✓ Carbohydrate (CHO)**
- ✓ Fat**
- ✓ Protein**

All of these fuels are considered to be foods that are eaten in large quantities; therefore, they are referred to as macronutrients.

Carbohydrate

Carbohydrates are vital to a healthy diet and one of the keys to successfully completing any endurance activity or training. Carbohydrates are abbreviated CHO and, luckily for us, they are foods that we are encouraged to eat.

Carbohydrates are made up of carbon, hydrogen and oxygen. You have probably heard them referred to as simple and complex. Simple CHO's have one or two sugar molecules hooked together. Complex CHO's have three or more simple sugar molecules hooked together.

Simple CHO's

Simple CHO's include table sugar, honey, fructose (sugar in fruits), maltose (sugar in malts), lactose (sugar in milk), brown sugar, corn syrup, maple syrup, refined sugar, raw sugar, corn sweeteners and molasses.

If you do a little label reading you will find these simple CHO's in:

- ✓ Sweet Tea**
- ✓ Sodas**
- ✓ Sports Drinks**

These are just a few of the many sources of simple CHO's. Most anything processed that requires a sweetener uses these ingredients in the recipe.

Complex CHO's

Complex CHO's include grains, fruits, seeds, potatoes, pasta, seaweed, algae and legumes (beans and peas) and all other vegetables. The main form of the complex CHO's are starches and fibers and both come from plant material.

Sources of complex CHO's include:

- ✓ **Breads**
- ✓ **Apples, Oranges, Pears, Bananas (all fruits)**
- ✓ **Sunflower seeds, peanuts, almonds**
- ✓ **Potatoes**
- ✓ **Pastas**
- ✓ **Beans, Peas (all vegetables)**

The starches in these foods are digestible however, the fiber is not. The only CHO that is stored in the body is “glycogen” which is found in the liver and muscles. The amount of glycogen stored in the liver and muscles is very minimal. The glycogen supply in the muscles can be totally depleted after 3-4 hours of heavy activity. And all reserves from the liver can be depleted in 24 hours if there is no intake.

CHO is used in the body as fuel in the form of glucose. This is the most critical source of energy in our body. It is stored in the muscles and liver as glycogen. All complex CHO's are digested into simple sugars and used by your body organs and muscles as energy. CHO's also create the platform to produce the chemicals needed by the cells of your body and provide the chemical “glue” for repairs to structures of the body.

Carbohydrates in the Diet

In the United States our familiar CHOs are bread, potatoes and pastas. Unfortunately, many of us have been told that starches are unhealthy and lead to weight gain. The reason for this is because of all the added high fat toppings and sauces that are used on the starches. Most people add lots of butter, sour cream and cheese to their baked potato, cheese and cream sauce on their pastas and butter and cream cheese on their bread. As you start to learn the components of your food keep in mind that:

One gram of CHO supplies 4 Calories.

Selecting Foods High In Complex CHO

Breakfast Cereals

**Oatmeal
Cornflakes
Cheerios
Grapenuts
Granola
Raisin Bran
Wheatena
Wheaties**

Grains

**Bagel with Jelly
Whole Wheat Bread
English Muffin
Pancakes
Rice
White Potatoes
Sweet Potatoes
Noodles
Tortilla
Waffles
Muffins**

Fruits

**Oranges
Bananas
Cantaloupe
Peaches
Apples
Pineapple
Grapefruit
Strawberries**

Vegetables

**Broccoli
Cauliflower
Carrots
Eggplant
Squash
Tomato / Tomato Sauce**

Beans/Legumes

**Black-eyed Peas
Chick-peas
Kidney Beans
Lentil Stew
Lima Beans
Pinto Beans**

Sandwiches**Other Ideas**

**Bagel w/ Peanut Butter and Jelly
Chicken, Lettuce, Mustard on Rye
Chicken Burrito**

French Roll w/ Tuna, Lettuce, Pickles

Pita w/ Turkey, Lettuce, Mustard

Pita w/ Mashed Beans, Onions

Tortilla w/ Beans, Lettuce

Pasta with Turkey and Veggies

Rice with Chicken and Veggies

Pasta with Tuna, Celery, Onions

Fruit Salad

Spaghetti and Sauce

Chicken Noodle Soup

Potato Salad

Low Fat / High CHO**High Fat / High CHO**

All Fruit

Raisins, Dates, Prunes

Popcorn, Pretzels

Bagels with Jelly

Cookies

Cakes

Candy Bars

Ice Cream

Fat

Fat is an essential part of your diet. Fat is the component that adds flavor to food and satisfies your sense of hunger. It is important to understand the different types of fat and how they work in the body. By calculating your daily fat intake, you can ensure that you eliminate excess fat that can be harmful.

There are three major types of fats:

- ✓ **Saturated**
- ✓ **Monounsaturated**
- ✓ **Polyunsaturated**

Saturated fats are found as solids at room temperature and are found primarily in animal foods like: red meat, lard, butter, poultry with skin, whole milk dairy products. Saturated fats are also found in palm and coconut oils.

Mono and polyunsaturated fats remain liquid at room temperature. Monounsaturates are found in olives, olive oil, avocados, and peanuts. Polyunsaturated fats are found in fish, corn, wheat, nuts, seeds, and vegetable oils such as peanut, sunflower, and corn oils.

Function of Fats

Fat is our main form of stored energy, it provides energy during exercise, in cold environments, and when you don't eat. It also insulates the body and helps carry other nutrients to places in the body. It also protects your organs.

Fat is very important and essential to your diet. It is the amount and type that can become a problem.

A small amount of each type is desirable, but too much fat is the primary dietary problem leading to heart disease, obesity, cancer, diabetes.

Most health experts recommend that fat intake be no more than 30% of total daily Calories, and saturated fat should provide no more than 10% of the total daily Calories.

Energy From Fat

One gram of FAT = 9 Calories

Fat provides more than twice the energy supplied by carbohydrates.

Determining Your Daily Fat Allowance

If you are going to keep your fat intake below 30% of your total Calories you will have to do a little math.

Example:

If your estimated energy need (EEN) = 3000

**Multiply EEN by 0.3 to get Calories from fat
 $3000 \times 0.3 = 900$ fat Calories**

**Divide fat Calories by 9 to get grams of fat.
 $900 / 9 = 100$ grams of fat per day.**

Of those 100 grams of fat no more than 33 grams should be from saturated fat in order to remain at or below the 10% saturated fat allowance.

Determine your Fat Allowance

Estimated Energy Need (EEN) = _____
Step 1. EEN x 0.3= _____
Calories from Fat = _____
Step 2. Calories from Fat/9 = _____
Grams of Fat per Day = _____

Calculating % of Calories From Fat

Food	Total Calories	Grams of Fat	Fat Calories	% of Calories
Hot Dog	183	16.6	16.6 x 9 = 149.4	149 x 100/183 = 81.6%
Double Cheese Pizza, 1 slice	370	19	19 x 9 = 171	171 x 100/370 = 46.2%
Barbecue Potato Chips	278	18.4	18.4 x 9 = 166	166 x 100/278 = 59.7%
Tootsie Roll	112	2.5		
BLT Sandwich w/ Mayo	282	15.6		

Protein

Unlike carbohydrates and fats which contain only carbon, oxygen and hydrogen, protein also contains nitrogen and other elements essential for life. Proteins are made up of several amino acids. We must eat protein to take in the essential amino acids because our body does not produce them.

Some functions of protein are:

- ✓ **Muscle, hair, nails, skin**
- ✓ **Direct energy production**
- ✓ **Repair injuries**
- ✓ **Carry fats, vitamin and mineral to different parts of the body**
- ✓ **Muscle contraction**
- ✓ **The main structural role for every part of the body**

How Much Should I Eat?

Most people consume about 200 grams of protein each day which is more than is actually needed. Protein needs are determined by age, body weight, and activity level. There is a misconception that if you eat more protein your muscles will grow larger, but this is not true. Excess Calories from protein can be converted to fat and stored. Additionally, the liver and kidneys are put under a lot of strain when processing large quantities of protein.

Grams of Protein Per Pound of Body Weight	
Activity Level	Protein Factor
Low to Moderate	0.5 grams
Endurance Training	0.6 – 0.8 grams
Strength / Weight Training	0.6 – 0.8 grams

Example:

Suppose you weigh 170 pounds in Smoke Diver School. You are most certainly “in training”. Your protein need would be 0.6 to 0.8 grams per pound of body weight.

$$\text{Protein Needs} = 0.8 \times 170 = 136$$

MY PROTEIN REQUIREMENTS DURING SMOKE DIVER SCHOOL ARE:				
_____	X	0.8	=	_____
Body Weight		Protein Factor		Grams Per Day

Energy From Protein

One gram of PROTEIN supplies 4 Calories

Protein supplies about the same energy as carbohydrates.



Fluid Replacement



Water makes up approximately 60% of your total body weight. The leaner you are, the more body water you have. Therefore, water must be consumed regularly to ensure that you function normally.

Water serves many important roles;

- **Assists in digestion and absorption of nutrients**
- **Participates in excretion of wastes**
- **Essential for maintaining blood circulation**
- **Maintains body temperature**

A loss of 20% of body water can be fatal, and if 4% of your body weight is lost through sweating, large decrements in decision-making, concentration, and physical work occur. Being well hydrated is critical to being able to perform during this class and during any physically demanding event. The Oklahoma Smoke Diver class has a mandatory hydration policy that requires you drink a certain amount each day depending on the activity. Your fluid intake is monitored and documented to ensure your compliance.

Percent of Body Weight Loss and the Effects

0	Feeling Normal
1	Feeling Thirsty
2	Increasing thirst, feeling uncomfortable
3	Dry mouth, urine output reduced, blood volume declining
4	Reduced physical performance, feeling sick
5	Difficulty concentrating, sleepiness, headache

How to Maintain Water Balance

Water balance, like energy, is determined by your water or fluid input and output. In order to maintain performance, it is critical that dehydration does not occur. Dehydration is simply when your water output exceeds input and the balance becomes negative. The average man loses .9 to 2.4 quarts of water per day. Water is lost:

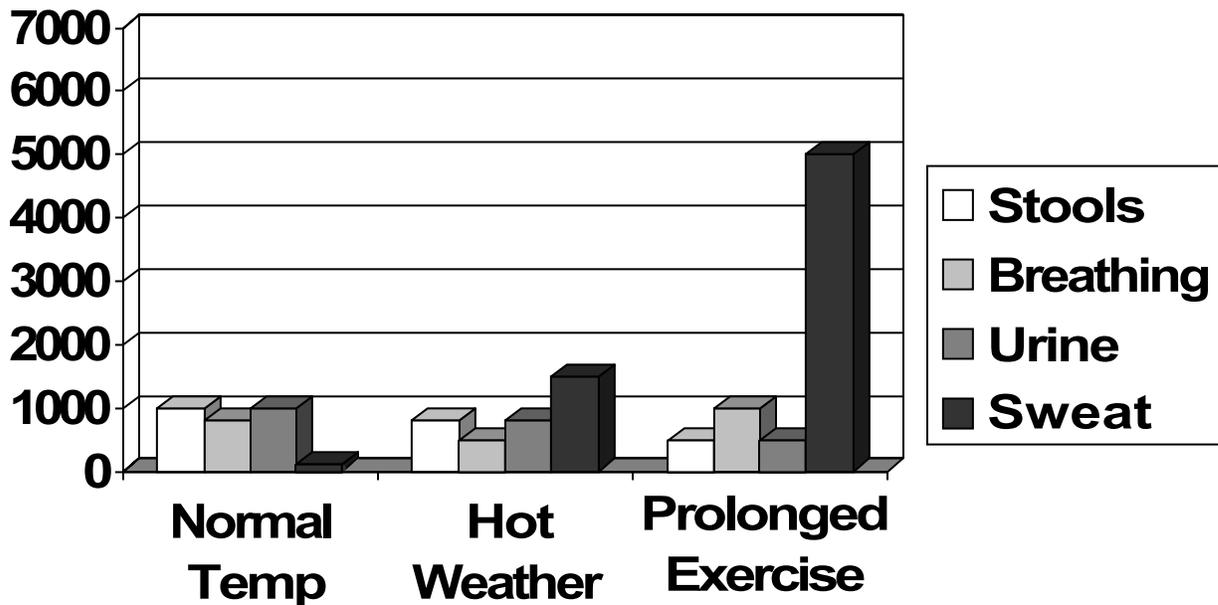
- In the urine**
- Through breathing**
- By sweating**
- Through stool**

When your activity level is low, most fluids are lost through the urine. However, when activity level is high and or the outdoor temperature is high, most fluid is lost by sweating. It is possible

to lose 1.8 quarts per hour through sweating, depending on the temperature.

All fluid lost must be added back to the body each day to maintain fluid balance. The easiest way to restore fluid balance is by drinking water.

Water Loss Method Comparison in ml



What Conditions Will Increase Water Losses?

- Exercising for over 30 minutes
- Working in a hot environment
- Working in a cold environment
- Drinking alcohol
- Exercising with a hangover

How to Make Sure to Get Enough Fluids

- **Do not rely on thirst as a good indicator of fluid needs; body weight losses are better**
- **Before any exercise or evolution, you should drink fluids, in anticipation of losing fluid**
- **Before you start, make sure your urine is clear. This is a sign that you are well hydrated. The more dehydrated you are, the darker your urine will be**
- **Drink regularly or whenever possible during your operations**
- **Weigh yourself before and after an event to determine how much fluid you have lost – for every pound of weight lost, you should drink 16 ounces of fluid (2 cups or 500ml)**

What You Should Drink

The type of activity you are involved in will determine what you should drink, however the drink should:

- **Taste good**
- **Cause no gastrointestinal or stomach discomfort**
- **Be rapidly absorbed**
- **Contain sodium and potassium**
- **Have an osmolality of less than 350 mOsm/L**

Osmolality is the number of particles in a solution. If it is high (over 350), the fluid can cause stomach distress and not be absorbed well if you drink it shortly before or during physical activity. Because of this you may need to consider sports drinks, you should dilute them or drink an equal amount of water.

You will need to ingest a beverage that provides energy in the form of carbohydrate (CHO) to the working muscles. Fluids with glucose polymers, which are complex CHOs are usually preferred over the glucose and sucrose drinks which are simple CHOs.

Comparison of Fluid Replacement Beverages

Beverage	CHO Source & Concentration	Sodium (mg)	Potassium (mg)	Osmolality (mOsm/L)
Gatorade	6% Sucrose/Glucose	110	25	280-360
Exceed	7.2% Glucose Poly-Mers/Fructose	50	45	250
Body Fuel	4.2% Maltodextrin/Fructose	80	20	210
Coca Cola	11% High Fructose Corn Syrup/Sucrose	9.2	trace	600-715
Sprite	10.2% High Fructose Corn Syrup/Sucrose	10	trace	695
Orange Juice	11.8% Fructose/Sucrose/Glucose	2.7	510	690
Water	-----	low	low	10-20

When and How Much to Drink?

For Smoke Diver class you will need to model your hydration based on moderate to high intensity activity lasting 1-3 at a time. There will be several of these periods each day.

Before	Water	0 to 2 hours before	8-16 oz per hour
During	5-8% beverage w/ CHO and electrolytes	Every 20 to 30 mins	12-24 oz per 30 mins
After	5-8% beverage w/ CHO and electrolytes	0-2 hours after	8-16 oz per 30 mins Check your weight since you may need more

The Oklahoma Smoke Diver Association is constantly monitoring and capturing data regarding fluid intake. It is difficult to know at this point exactly how much fluid each candidate loses each day we estimate that during moderate weather you will lose 8-12 quarts of fluid per day. This equates to 250-320 ounces per day which is 5-6 8oz cups per hour.

During and after activity you will need to be replacing carbohydrates. You will have to calculate your CHO replacement needs and manage your fluid intake accordingly. The following chart shows the most readily available sport drinks and the carbohydrates delivered by specific number of 8oz drinks.

Carbohydrates (CHO) Delivered by Gatorade and Powerade (6% CHO)

CHO Delivered per hour	Volume of Beverage Required
20 grams/hr	1.5 x 8oz
30 grams/hr	2.25 x 8oz
40 grams/hr	3 x 8oz
50 grams/hr	3.5 x 8oz
60 grams/hr	4.25 x 8oz

Hydrate before class



Hydrate during class

Hydrate after activity

Hydrate after class

Hydrate in the evenings

Caloric Values of Selected Fast Foods

Dinner Items	Energy (Kcal)	CHO (grams)	Fat % of Energy	CHO % of Energy
Burrito w/Beans (2)	448	71	27	64
Burrito w/Beef (2)	523	58	36	45
Brownies, (1)	243	39	37	64
Chicken, breast fried (2)	494	35	65	15
Chocolate Shake	360	58	26	64
Chocolate chip cookie	233	36	42	52
Coleslaw	147	13	67	35
Corn, w/butter	155	32	10	82
Chili	254	22	29	34
Cola	151	37	0	99
Fried Fruit Pie	266	33	48	49
Fish Sandwich	524	47	49	36
Hot Fudge Sundae	284	48	31	79
Hot Dog, w/chili	297	31	40	42
Onion Rings	332	37	50	45
Pizza, w cheese (2)	218	32	21	59
Potato Chips (10)	105	10	60	39
Potato, French fries	237	29	46	49
Potato, baked (w/ sour cream)	394	50	49	44

More Recommendations for Selecting High CHO Foods at Restaurants

When Placing an Order:

- **Order a clear soup, tomato juice, steamed seafood, or fruit as an appetizer**
- **Order a salad with light dressing. Avoid salads with cheese, nuts, eggs, meat or croutons. Avoid potato salad and coleslaw**
- **Order broiled, grilled, roasted or baked lean meat, poultry or fish. Avoid casseroles and heavy sauces**
- **Order baked potato or plain rice – not pasta with sauces (plain pasta is good)**
- **Order juices- they are all high in CHO**

During Your Meal

- **Eat plain rolls, breadsticks or plain crackers rather than biscuits or croissants. Avoid spreads or use sparingly.**
- **Minimize eating chips (potato or corn)**
- **Trim fat off meat**
- **No alcohol**

In the Dorm Room

- **Keep bananas for snacks**
- **Consider using a juicer and making fresh juice from apples, carrots, oranges, and other fruits or vegetables that you like. These fruit juices are loaded with carbs and will be a great meal supplement before bed**
- **Consider juice with bagels and bananas for breakfast between 5:30-6:00 along with several glasses of water. You should experiment with breakfast foods (*before Smoke Diver week*) at this time of day and then complete your workout to see if the any foods cause you problems.**

Nutritional Considerations for the Week

Smoke Diver School is extremely demanding both physically and mentally. Your ability to perform in this environment will be greatly increased by regular physical training and by eating foods that create the right fuel for you. The failure to replace the energy or fluids lost during prolonged training, deployments or long-term incidents can greatly hamper your performance.

During this training you will need to increase your caloric intake of carbohydrate (CHO) foods to meet your body's energy demands. If you fail to do this it may result in:

- **Inability to sleep**
- **Chronic muscular fatigue**
- **Weight loss**
- **Decrease in motivation**

Liver and muscle glycogen is the primary source of glucose for your muscles during this week's activity. Once your glycogen stores are depleted your ability to continue to perform will decrease quickly. Your levels will be lowest in the morning because of the lapse in time since you last ate. Therefore, breakfast is critical to maintaining energy balance and liver glycogen stores.

Make sure to keep a weight chart everyday to help you stay on track with your nutritional needs.

Individuals who are on a high CHO diet have three times the capacity of individuals on a high fat diet.



You should eat 2.5 to 4 grams CHO per pound of body weight each day

EXAMPLE

You weigh 175 lbs and work out two hours each day

2.5 x 175 lb = 437 grams of CHO

4 x 175 lb = 700 grams of CHO

Your CHO needs are between 437 and 700 grams per day

Calculating Your Daily CHO Needs

You weight in lbs = _____

2.5 x _____ lb = _____ grams of CHO

4 x _____ lb = _____ grams of CHO

Your CHO needs are between _____ and _____ grams per day

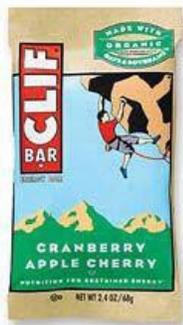
Another way to think about CHO needs is in terms of energy intake. 60% to 65% of your daily energy should come from CHO. When energy intake is greater than 4,000 Calories the 60% is what you should strive for. Each gram of CHO is 4 Calories so we can calculate the number of grams needed from your energy intake.

Example

**You train 3 hours and eat 3,500 kcal per day
60% of Calories from CHO =
 $3,500 \times 60/100 = 2,100$ kcal from
CHO Amount of CHO =
 $2,100/4 = 525$ grams of CHO**

Eat high CHO snacks in between training sessions to replace your glycogen stores

Consume at least 50 grams of CHO immediately after the completion of PT and continue a min of 50 gram every 2 hours during non training hours for 200 grams each evening.



Rehydration

Begin rehydrating immediately after an activity and continue through non-class hours. Forced fluid ingestion is essential because you may not feel thirsty. Normally, voluntary consumption of fluids will restore only half of the fluid lost. You must weigh yourself after class and compare your starting weight. Over a period of several hours you should: Drink at least two 8oz. cups of fluid for every pound of body weight lost. Fluid replacement beverages ingested during exercise are also appropriate for Rehydration. During your activity keep the CHO percentage around 6%. After class you can drink a higher CHO drink.

Sodium/Electrolyte Replacement

Sodium and potassium losses in sweat can be extremely high during Smoke Diver training. This has led to many medical discharges over the years. Replacing these electrolytes is an important part of your hydration and rehydration plan. Most fluid replacement beverages contain electrolytes. Also, sodium is widely present in a variety of foods, but if the weather is warm each quart of fluid you consume should contain about one quarter teaspoon of salt.

A small amount of salt will speed up rehydration better than plain water. Typically, your sport drinks will contain both sodium and potassium, but your recovery foods should also include foods rich in potassium.

Good Sources of Potassium



Potassium Foods?

- 1 banana has 569 mg
- 1 baked potato w/skin has 844 mg
- 1 slice of watermelon has 600 mg

Other Foods high in Potassium

- Apricots, dried
- Dates
- Dried peaches
- Yogurt

Potassium Drinks?

- Orange Juice
- Tomato juice
- Pineapple juice
- Grapefruit juice
- Skim Milk



1 cup of orange juice or tomato juice will replace the potassium, calcium and magnesium lost in 3 quarts of sweat.

Summary of Tips

- ✓ **High CHO foods and beverages are great recovery foods**
- ✓ **Consume 50 grams of CHO as food or drink immediately after the obstacle course**
- ✓ **Consume 200 grams of CHO each evening after class by eating approx. 50 grams every 2 hours**
- ✓ **Drink plenty of fluids after a tough evolution even if you are not thirsty**
- ✓ **Fruit juices are excellent recovery fluids as they provide CHO, vitamins, mineral, sodium and potassium**
- ✓ **If you can't tolerate solid foods after intense physical exertion, drink a beverage containing CHO.**

More Resources

You can obtain software to assist you in monitoring your caloric intake and output one such product can be found at: www.Calorieking.com

Many others including Calorie estimating books are also available.

If you have any pre-existing medical condition you should seek advice from your physician prior to changes in your nutritional plan.

When seeking advice about your workout and nutritional needs use Sport Nutritionist and Trainers.

The Oklahoma Smoke Diver School is a very intense endurance event lasting 6 days and averaging 10 hours per day. It is important that you prepare yourself by working out in firefighter gear. Do not make the mistake of thinking that if you can run 20 miles a day in shorts and tennis shoes that you are properly conditioned. Train like you fight!

References:

“The Navy SEAL Nutrition Guide”

Patricia A. Deuster, Ph.D. Anita Singh, Ph.K Pierre A. Pelletier, ENS, MC USNR

“Immunity Boost”

Nutrition strategies from recent firefighter work studies go far beyond “an apple a day”

Wildland Firefighter, January 2006

Dennis Childress

WebMD

www.WebMD.com

Heat Stress Control and Heat Casualty Management

U.S. Army Technical Bulletin 507 U.S Air Force Pamphlet 48-152 (!)

Oklahoma Smoke Diver Hydration Tracking

Oklahoma Smoke Diver Association

Calorie King

www.Calorieking.com

Approximate Energy Expenditure For Various Oklahoma Smoke Diver Activities

Activities	kcal/min	kcal/hr
1.5 Mile Run @ 8 min mile pace	14	848
3 Mile Run @ 10 min per mile pace	11	651
Classroom Sessions	2	97
Eating	2	97
Firefighting Drills	12	714
Obstacle Course w/ Gear	25	1500
Obstacle Course w/o Gear	10	600
Pool Drills	9	512
PT w/ Gear	14	848
PT w/o Gear	10	600
SCBA Time Drills	4	252
Sleeping	1	60
Standing in Gear	4	252
Walking in or with Gear	7	439

These estimates are based on comparisons of other activities and their established energy expenditures for an average 155lb male. The numbers are provided as a guide and example to assist you in determining your energy expenditure. The Oklahoma Smoke Diver Association is currently working to study and establish a standard energy expenditure chart for firefighting operations and training.

Energy Expenditure Work Sheet

Name _____

Date _____

Activity	Total Minutes	Energy Value kcal/min	Calories Expended
----- -----	----- -----	Daily Total	

