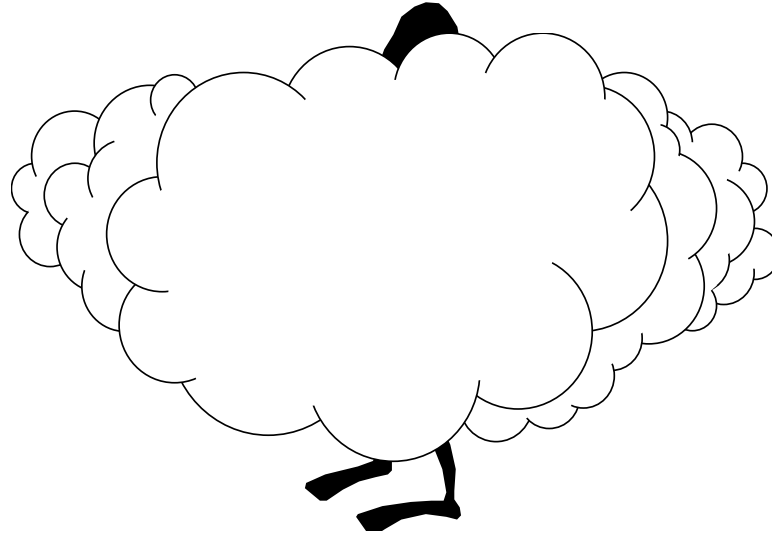


Self-Contained Self-Rescuer Capacity

Nicholas Kyriazi
Technology Evaluation Branch

Regulatory Requirements

- **30 CFR 75.1714** - Each operator shall make available to each miner who goes underground, and to visitors authorized to enter the mine by the operator, an approved self-rescue device which is adequate to protect such person for one hour or longer.
- **42 CFR Part 84** – Classification of respiratory protection devices by duration of use to a laboratory test standard
 - Open circuit – machine test
 - Closed circuit – man test
- **MINER Act of 2006** – Added redundancy to 30 CFR 75.1714
- **CCER Regulation** – The proposed regulation is in terms of capacity rather duration



SCSRs provide for your breathing needs when the air around you is unbreathable.

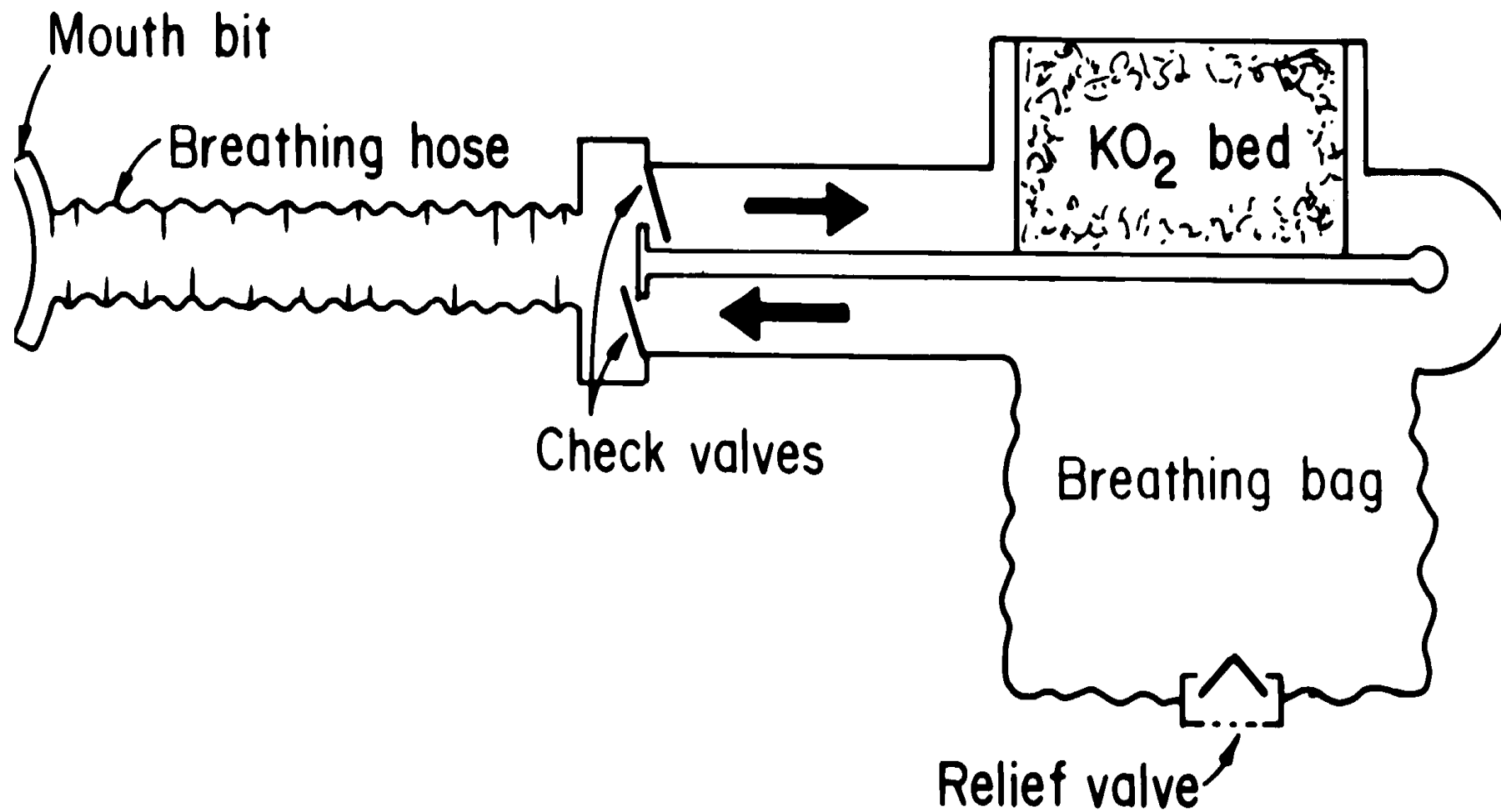
When you take a breath of air into your lungs, you use oxygen and give off (exhale) carbon dioxide.

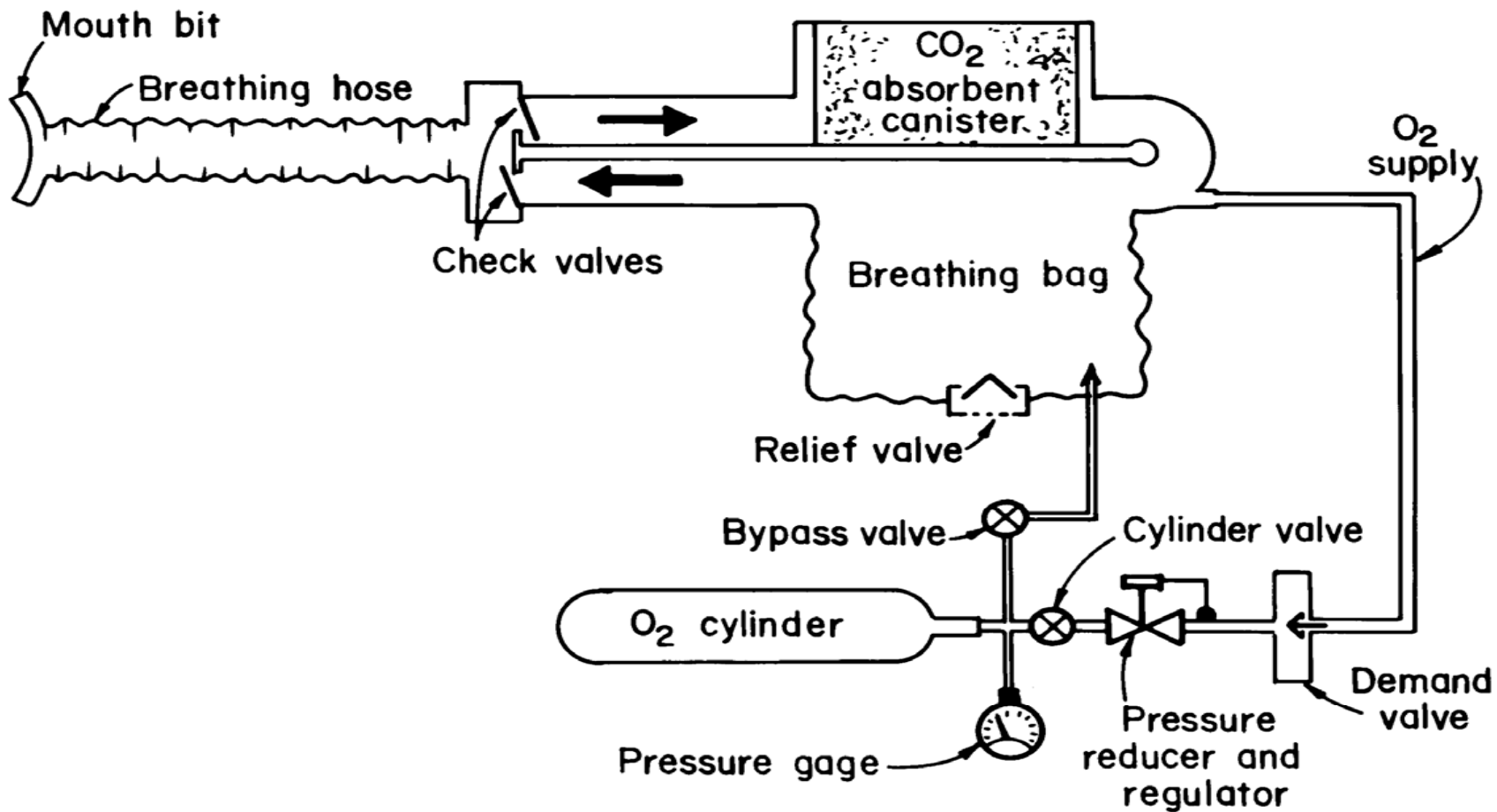


Plants do the opposite:
They absorb carbon dioxide and
give off oxygen.

What happens if you breathe back and forth from a plastic bag?

- **Oxygen decreases**
- **Carbon dioxide increases**





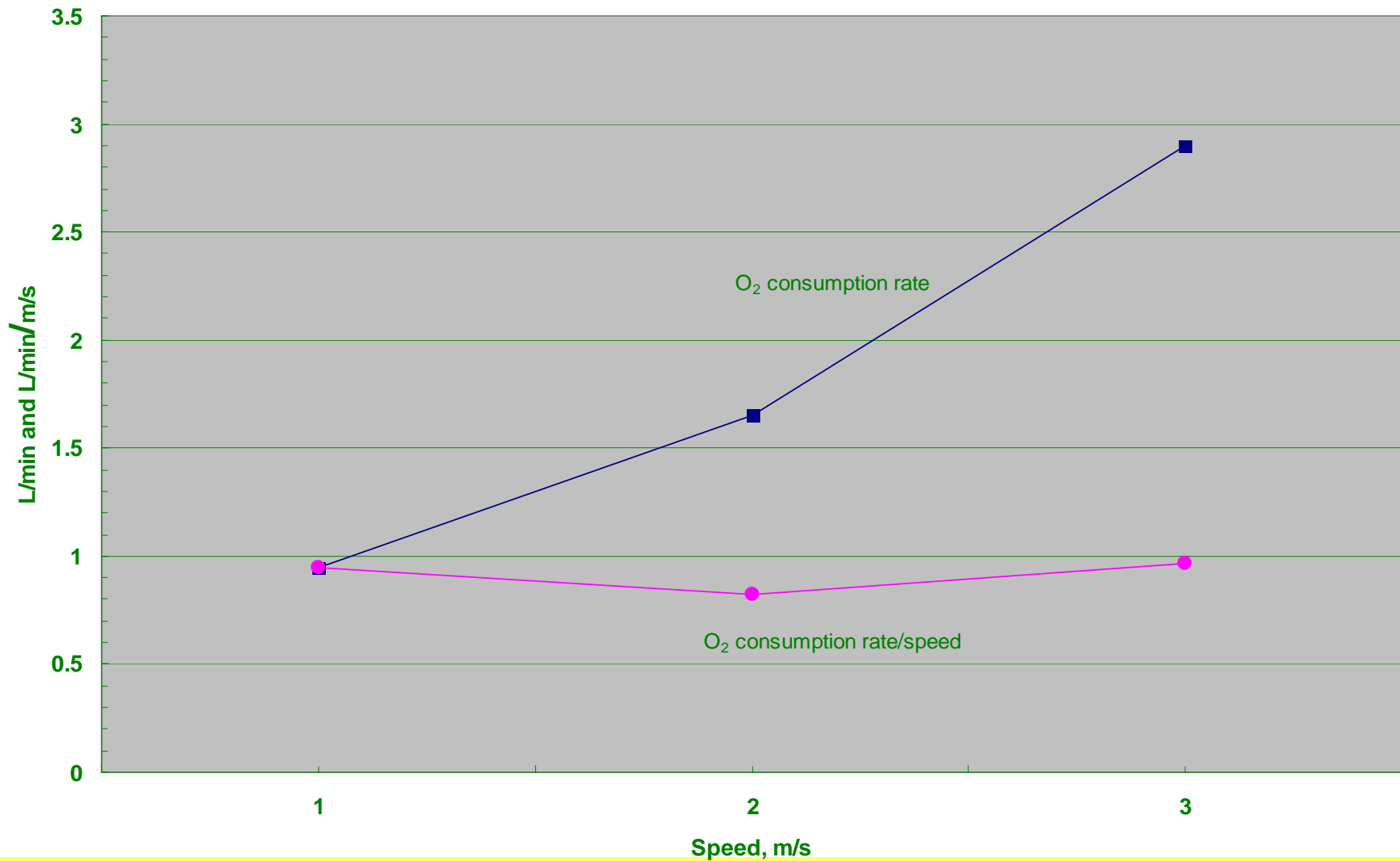
First Concept

- **SCSRs contain a certain quantity of oxygen. If you use it up faster, it won't last as long.**
- **SCSRs do not provide a fixed time of protection.**

Second Concept

- **Cars have gas mileage; humans have oxygen mileage**
- **If you put a gallon of gas in a car, it can travel a certain distance. If you give a man a liter of oxygen, he can also travel a certain distance. Speed has little effect on travel distance in both cases.**

O₂ consumption and O₂ consumption/speed



Third Concept

- **Just as a gallon of gas will generally take a smaller car farther than a larger car, the lighter you are, the farther your SCSR will take you.**

Gas mileage and gas usage for Large Car versus Small Car

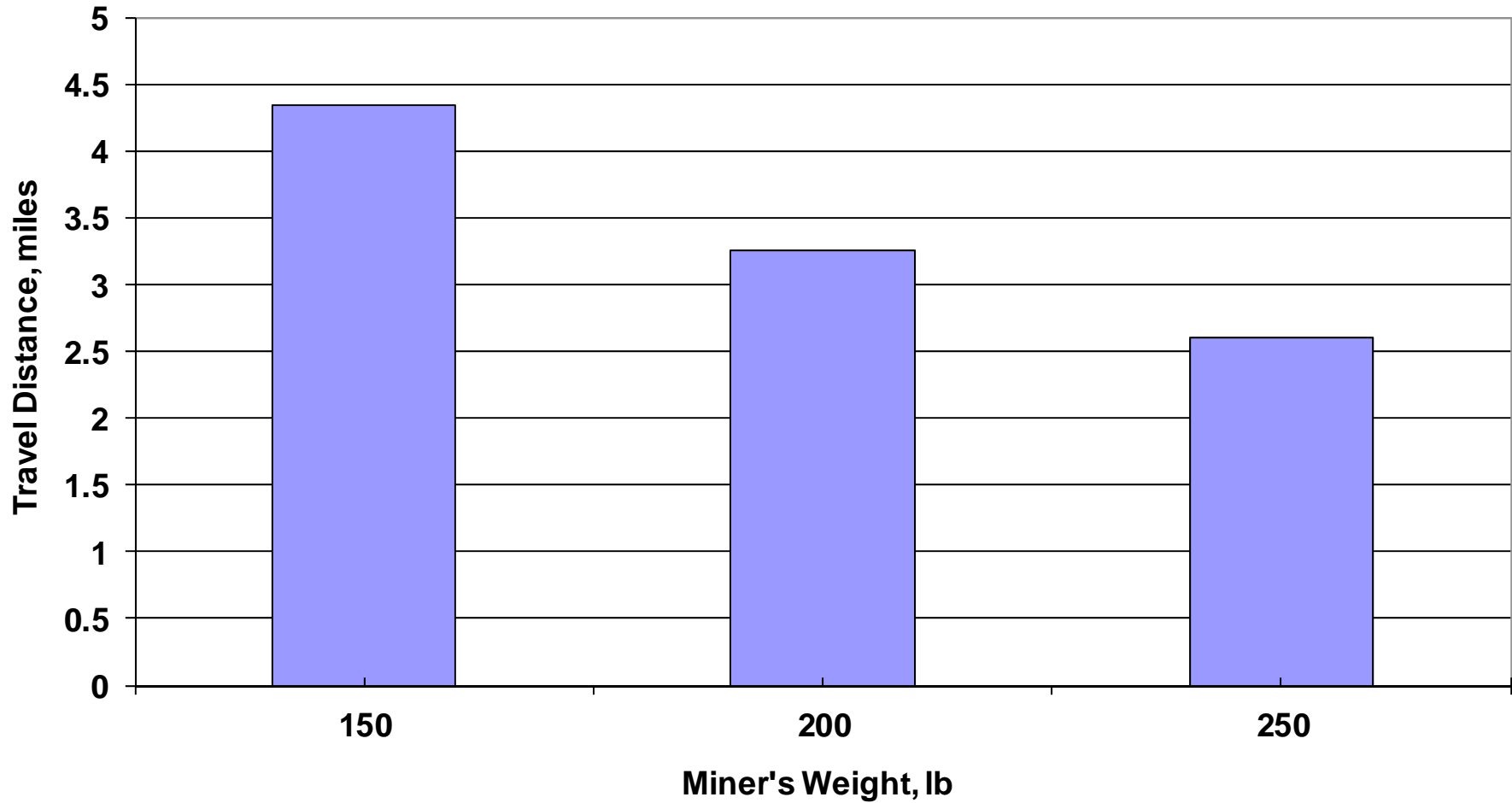
Large car

- **20 miles/gallon**
- or
- **0.050 gallon/mile**

Small car

- **40 miles/gallon**
- or
- **.025 gallon/mile**

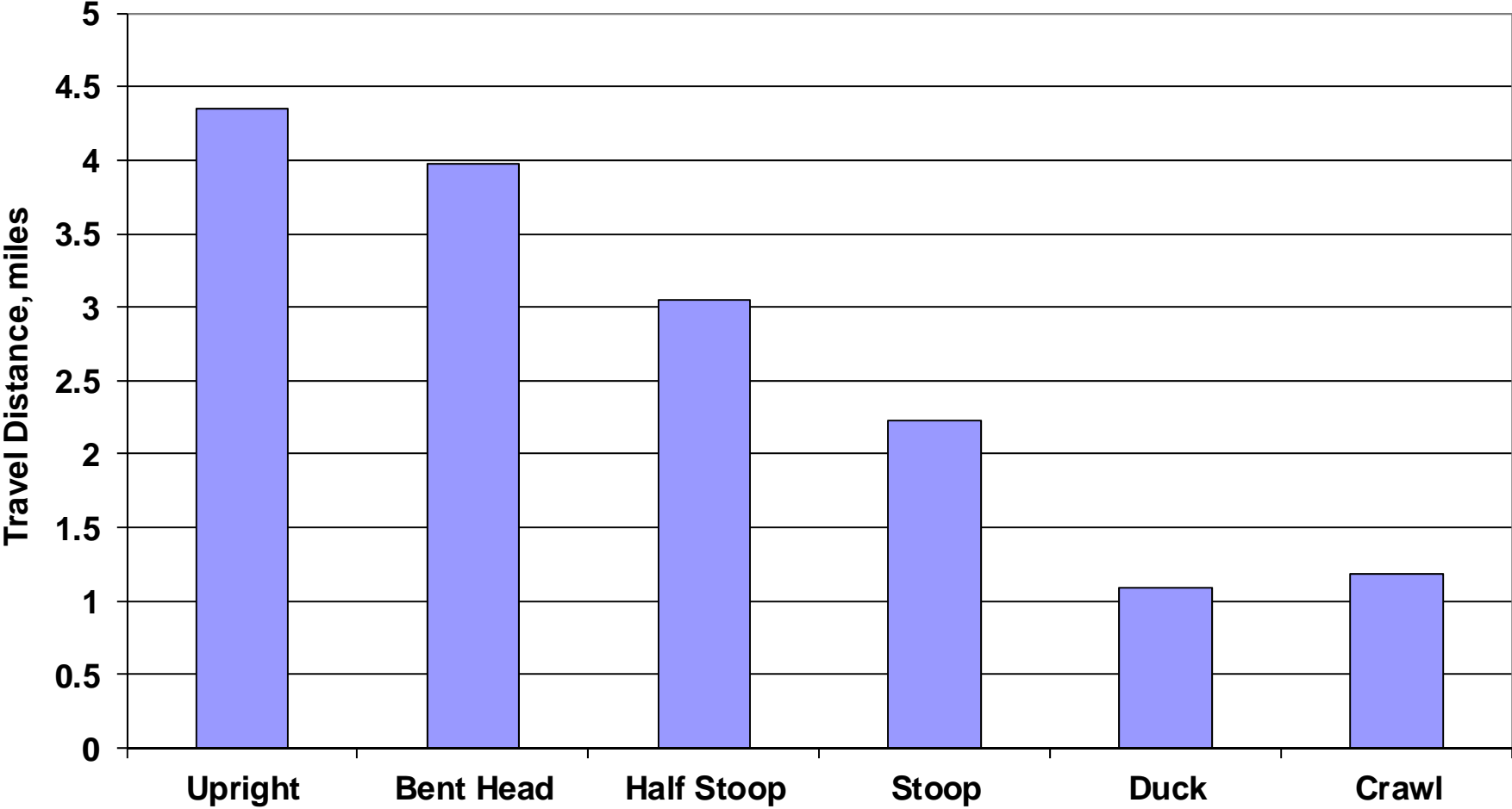
Approximate Travel Distance vs. User's Weight
Upright, Level Walking, Flat Ground, 100 L of Oxygen
(assuming similar physical fitness)



Fourth Concept

- **Body posture affects your possible travel distance.**
- **Upright walking is the highest oxygen mileage position and the possible travel distance is greatest.**

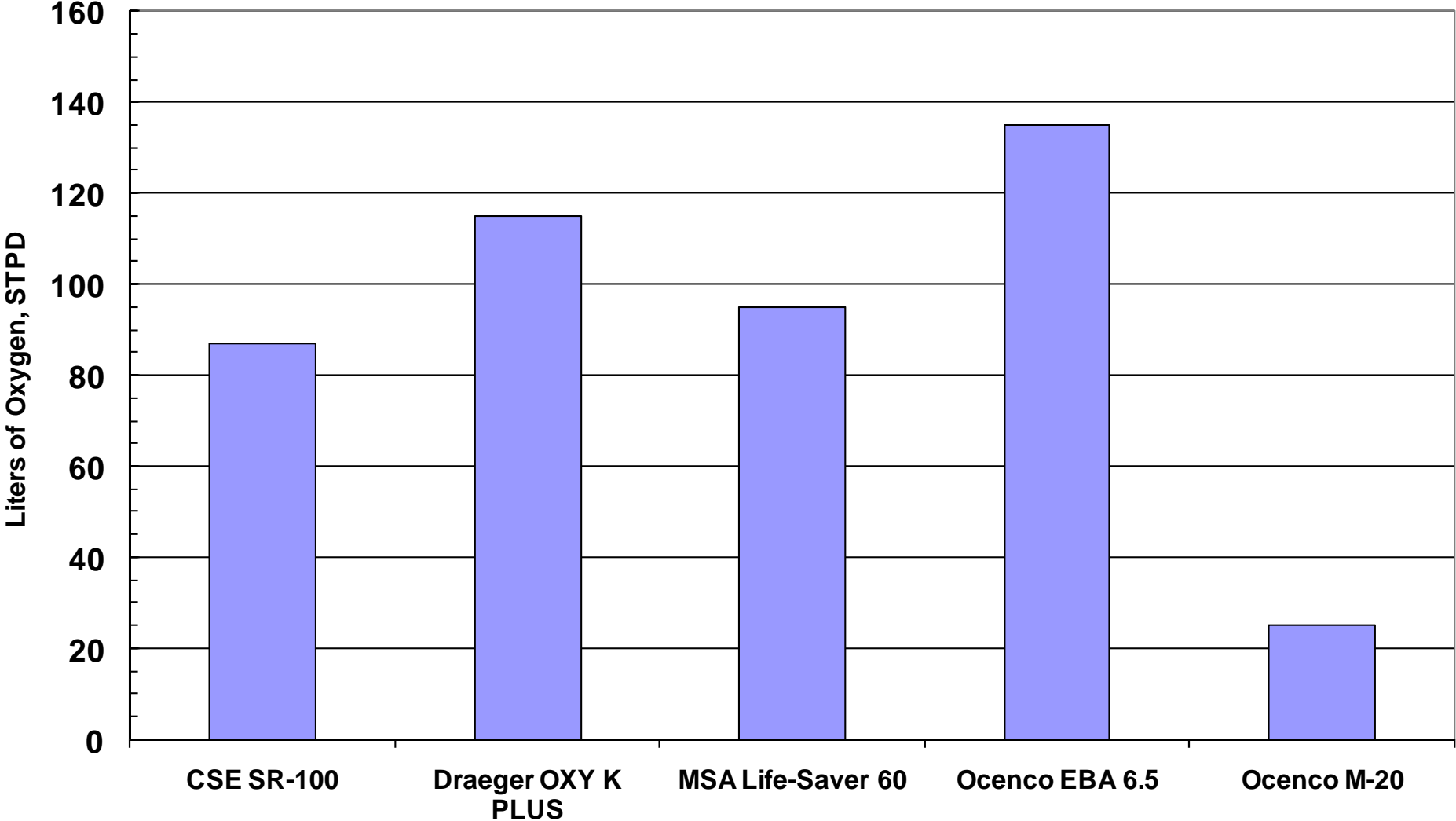
Approximate Travel Distance vs Posture for a 150-lb man with 100 L of Oxygen



Fifth Concept

- **Different models of apparatus contain different quantities of oxygen.**

Quantity Of Usable Oxygen



Summary

- **Apparatus selection is based on user need**
 - Assessment under extreme conditions
 - Simulated escape route
- **Estimated oxygen capacity needs are based on a variety of factors**
 - Size of user
 - Environmental conditions
 - Level vs. sloped
 - Seam height
 - Estimated oxygen capacity needs are based on a variety of factors

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Disclaimer:

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Thank you