ODOROUS SUBSTANCES

For Non Lethal Applications

Larry Bickford, Don Bowie, Dr. Ken Collins, Dr. Harry Salem

US Army Edgewood Chemical Biological Center

Dr. Pamela Dalton

Monell Chemical Senses Center

OUTLINE

1. HISTORICAL HIGHLIGHTS
   -L. BICKFORD

2. UPDATE ON PRESENT JNLWD WORK
   - DR. PAMELA DALTON

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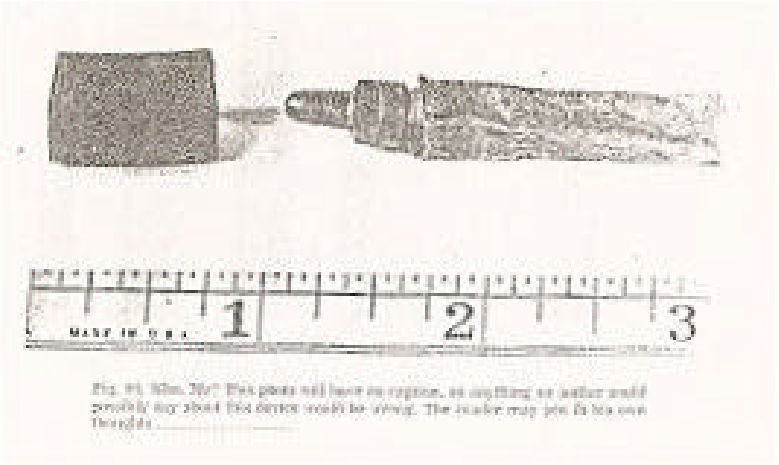
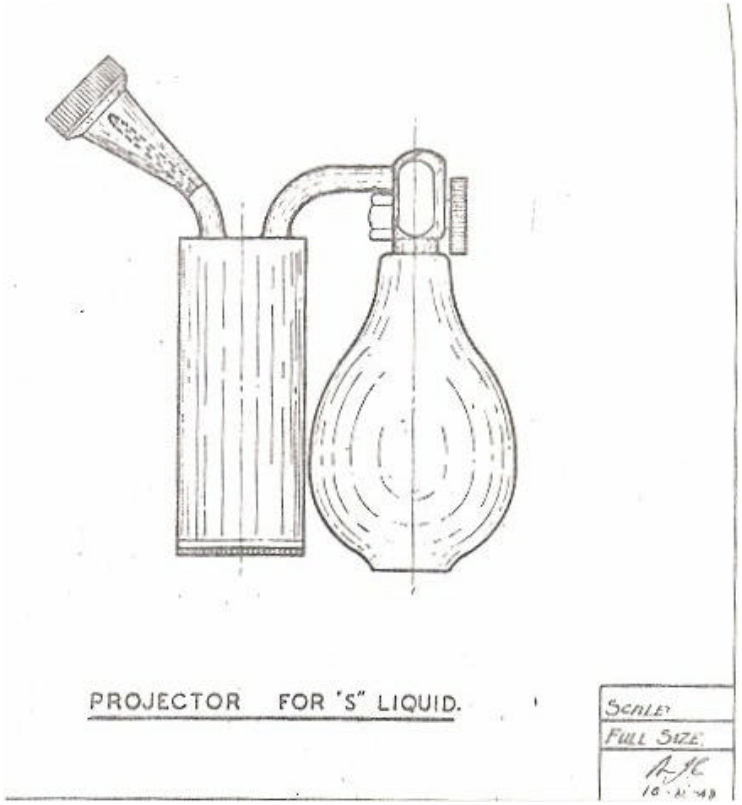
HISTORICAL HIGHLIGHTS

- **Camouflage Gas (1920's)**

- **OSS 'WHO ME' Device (1940's)**



- **British 'S Projector' (1940's)**



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HISTORICAL HIGHLIGHTS

- **1960's-1970's Qualitative Study on Use of Odorants for Riot Control**

- **M137 Training Simulator (early 1980's)**

- **Tests for Gas Masks (1980's)**

Criteria for Odorant Selection

- Perceived to be highly unpleasant by target group
- Quickly detected and dispersed
- Not easily habituated or adapted
- Not incapacitating or a sensory irritant

Odors Tested

- US Govt Standard Bathroom Odor
- Butyric Acid
- Vomit Odor
- Sewage Odor
- Burned Hair
- Cherry/Almond
- Cinnamon
- Lemon
- Menthol
- Vanilla

Dimensions of Odor Evaluation

Sensory	Intensity
	Irritation
	Pleasantness
Behavioral	Endurance
Cognitive	Recognition
Social	Wear/Eat
Emotional	Healthy/Harmful

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Odor Repellancy Ranking

(from most to least repellant)

Group 1	Group 2	Group 3	Group 4	Group 5
Bathroom Malodor	***Bathroom Malodor***	***Bathroom Malodor***	***Bathroom Malodor***	***Bathroom Malodor***
Who Me?	**Who Me?**	**Who Me?**	**Who Me?**	**Who Me?**
Butyric Acid	**Vomit Odor**	**Vomit Odor**	**Butyric Acid**	**Burned Hair**
Vomit Odor	**Butyric Acid**	**Butyric Acid**	**Sewage Odor**	**Sewage Odor**
Burned Hair	**Sewage Odor**	**Sewage Odor**	**Vomit Odor**	**Butyric Acid**
Sewage Odor	**Burned Hair**	**Burned Hair**	**Burned Hair**	**Vomit Odor**

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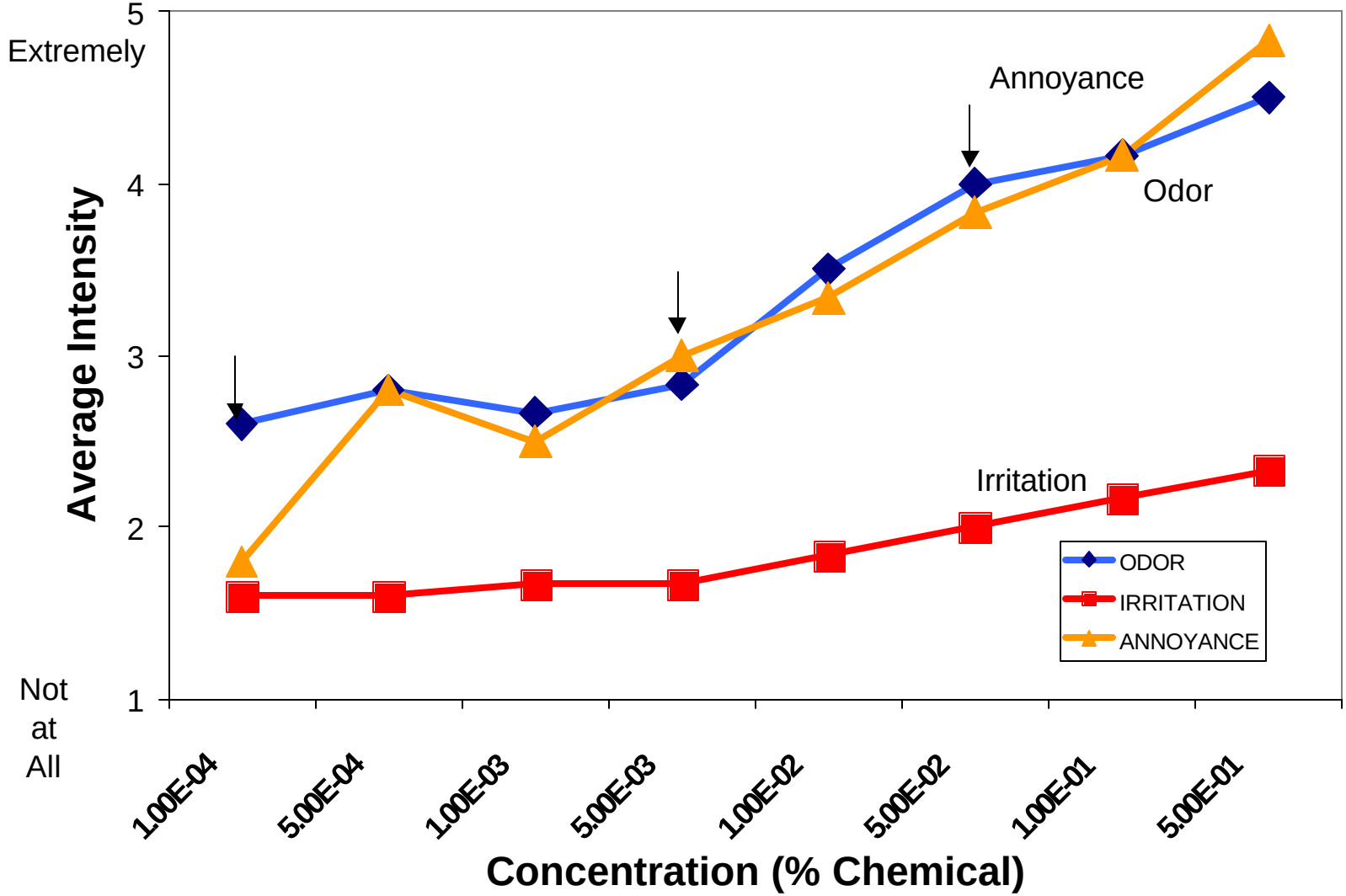
Responses to Bathroom Malodor



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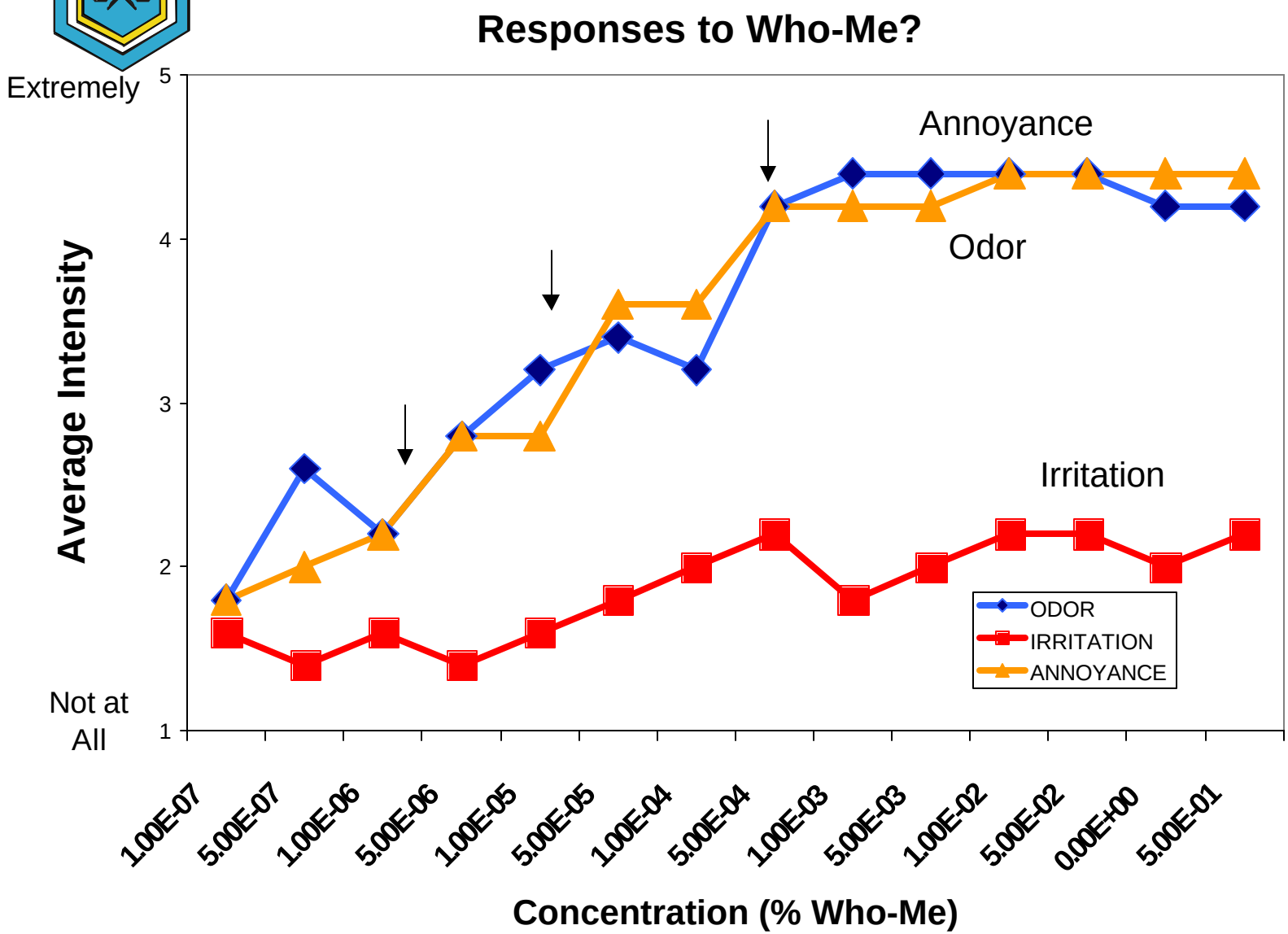

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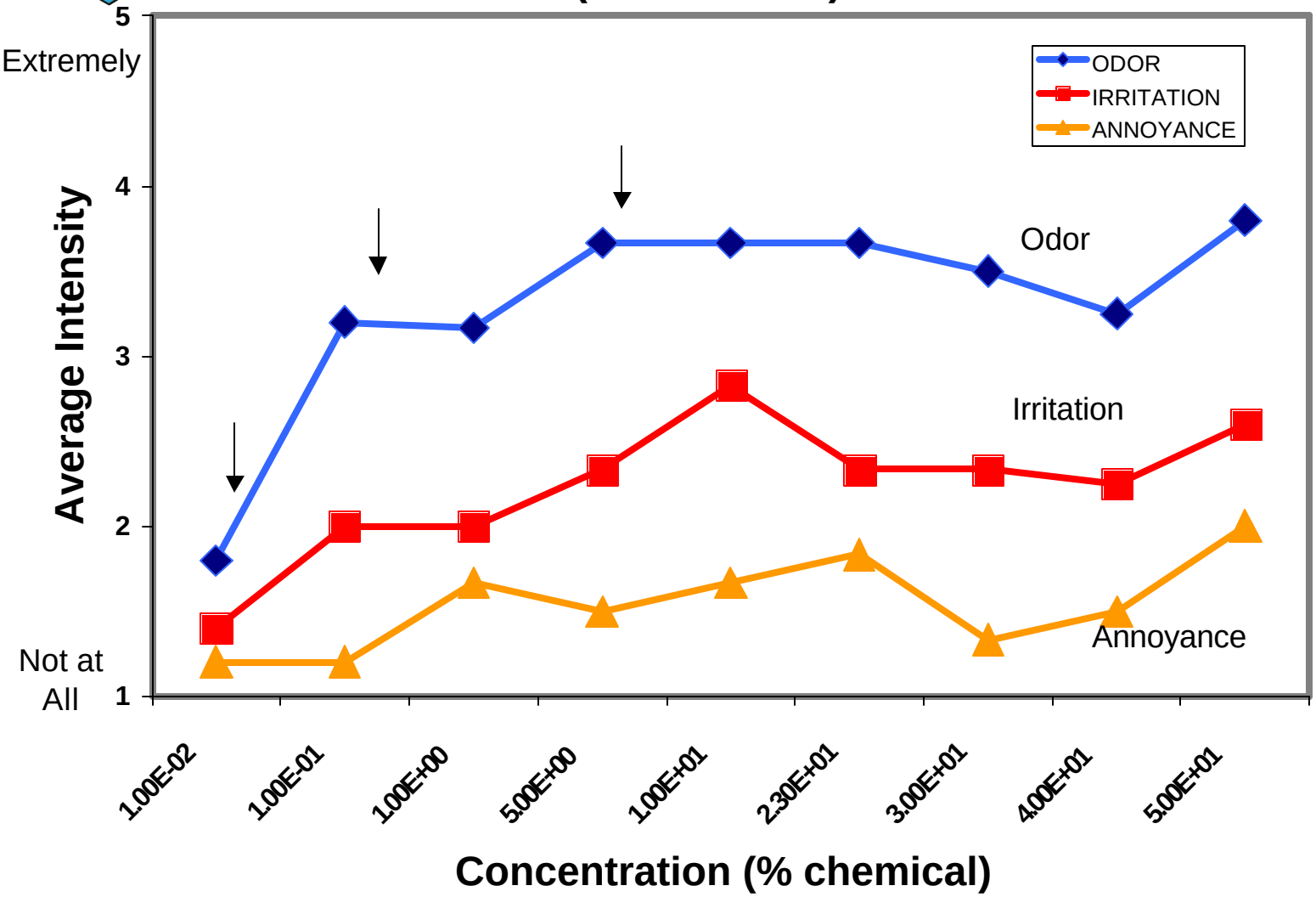
Responses to IBA (control odor)



ODOROUS SUBSTANCES

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Study 1 – Determination of Dose-Response

3- Groups (A,B,C) **3 males, 3 females/gp**

	Odorant Concentration		
Malodor	**1**	**2**	**3**
Bathroom Malodor	A	B	C
Who Me?	A	B	C
IBA-Control	A	B	C

Exposure: 5 minutes via hood
Psychophysiological measures: HR, respiration, EGG, EDA
Subjective: Odor intensity, irritation, annoyance

2 min. Baseline Period/Exposed to Clean Air

5 min Exposure to Malodor or Control

Preliminary Results: Psychophysiology

Medium and High Malodor Concentrations elicit:

- **reduction in respiratory volume**
- **increase in respiratory rate**
- **heightened electrodermal response**
- **suppression of gastric signal amplitude and increase in frequency, consistent with tachygastria**

Preliminary Results: Self-Report

Medium and High Malodor Concentrations elicit:

- **strong to very strong ratings of odor unpleasantness and annoyance**
- **transient symptom reports, such as nausea, gagging**
- **requests to terminate exposure due to unpleasantness of odor**

Next Steps

Research is underway to quantify individual's endurance for these malodors in whole-body exposures

- **under different incentive conditions ($$)**
- **with and without perceived control over exposure**

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