

# Accident Investigation / Road Vehicle Recovery 事故调查/道路交通恢复



Asia Industrial Gases Association

**12-13 SEPTEMBER 2006  
SHANGHAI**



# Accident Investigation / Road Vehicle Recovery

## 事故调查/道路交通恢复

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Air Products Asia



An investigation is an **In-Depth Analysis** of the accident intended to provide understanding of:  
调查是对事故的深入分析以加深理解以下几点

**HOW?** 方式/如何做

**WHEN?** 时间/什么时候

**WHY?** 原因/为什么



# Goals of an Investigation 调查的目的



- **Preventing recurrence by determining causes.** 预防相同原因导致重复的事件发生
- **Protecting against excessive financial liability.** 保护额外的财政债务支出
- **Providing an adequate and fair basis for driver discipline.** 对驾驶员纪律提供正确和公正的基石

# Supplies Needed 必需品



- Measuring wheel 测量轮子
- 30 meter measuring tape 30米长的测量带
- Chaining pin to hold end of tape 固定测量带的链销
- Spray paint and marking crayon 喷漆和标记色笔
  - ✓ Several colors; be prepared to use different color than police.  
多种颜色, 准备好使用比警察多的不同颜色的笔
- Pocket notebook and tablet or graph paper  
袖珍记事本和便笺或方格纸
- Micro-cassette recorder and camera ( w/ spare batteries)  
袖珍卡式录音机和相机(带备用电池)
- Flashlight 手电筒
- Business cards 名片
- Witness cards 证人卡片
- Cell phone 手机

# Witness Card 证人卡片



## WITNESSES

Name \_\_\_\_\_

Address \_\_\_\_\_

Phone Number \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Phone Number \_\_\_\_\_

# Area of Investigation 调查范围



- **Walk / drive and closely examine the path of travel for each vehicle involved in the collision.**  
密切检查涉及事故的每部车辆所经过的轨迹
- **Start 150-300 meters back**  
返回到150-300米的地方开始
- **Look for marks on road 寻找路面上的标记**
- **Disturbance to any roadside material**  
检查任意路边的物质
- **Damage to fixed objects 固定物体的损坏情况**
- **View at driver eye level 司机的视线范围**
- **Observe as close to same time of day as accident occurred 事故发生的当天进行观察**
- **Photograph any and or all of the above**  
拍摄以上观察到的任意/所有事物

What contributing factors should be recorded? 有什么起作用的因素需要被记录?



- **Roadway conditions such as slopes, curves, and markings.** 路面的状况, 如斜坡, 弯道和斑纹
- **Surface conditions such as ruts, holes, and bumps.** 表面条件, 如车辙, 洞和撞击处
- **Weather conditions and time of day.** 天气情况及时间
- **Any thing that would distract drivers attention**  
任意可能使司机分心的事物



# Evidence Recording 证据的采集



- **Get drivers' statements of what happened. 司机对事故的陈述**
- **Record statements from all witness even if statements conflict. 记录所有证人的陈述,即使其中有冲突**
  - ✓ **Keep witnesses separated when interviewing 分别与不同的证人见面**
  - ✓ **Establish a warm and professional atmosphere 营造温暖及专业的气氛**
  - ✓ **Your first impression will set the limit of how much info will be gained 你的第一印象将决定你能得到多少的信息**
  - ✓ **Listen more than you speak 多听少说**
  - ✓ **Note from where did the observation occur 注意他们观察点在哪里**
- **The number of vehicles involved and the conditions. 涉及的车辆数量和状况**
  - ✓ **Distinguish old damage from new 从新的损坏中辨别旧的**
  - ✓ **Record condition of tires, windows, and interior 记录轮胎、窗户及内部的状况**
  - ✓ **Most effective information about vehicles can be recorded by photographs 用摄相机拍下有关车辆的最有用的信息**
- **Metal scars, tire skid marks, and yaw marks. Need size, location and description. 金属疤痕,轮胎刹车和偏道的轨迹。 需要尺寸, 位置和描述。**

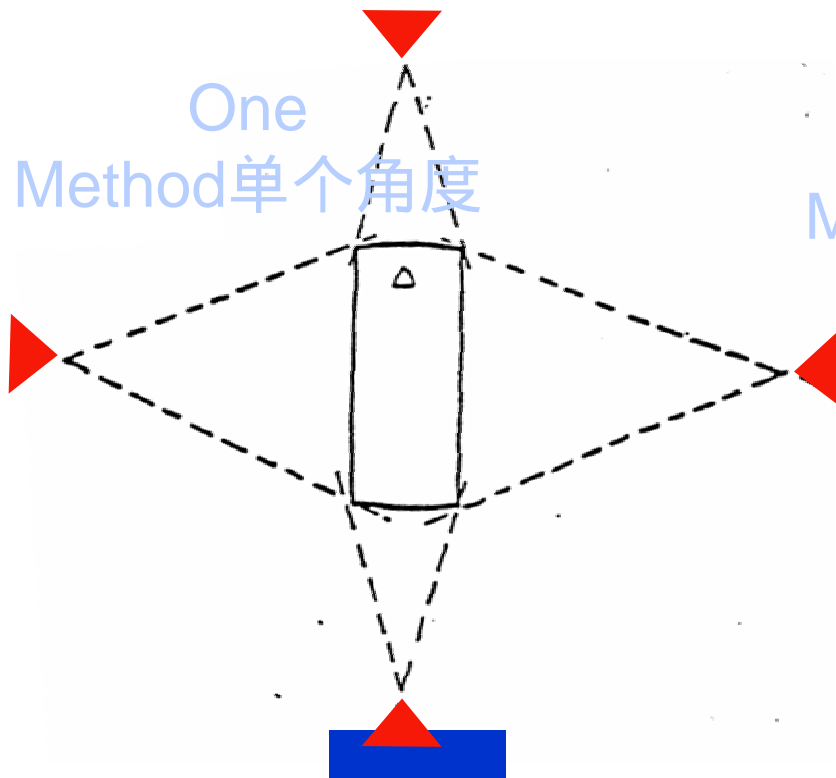
# Photographs 照片



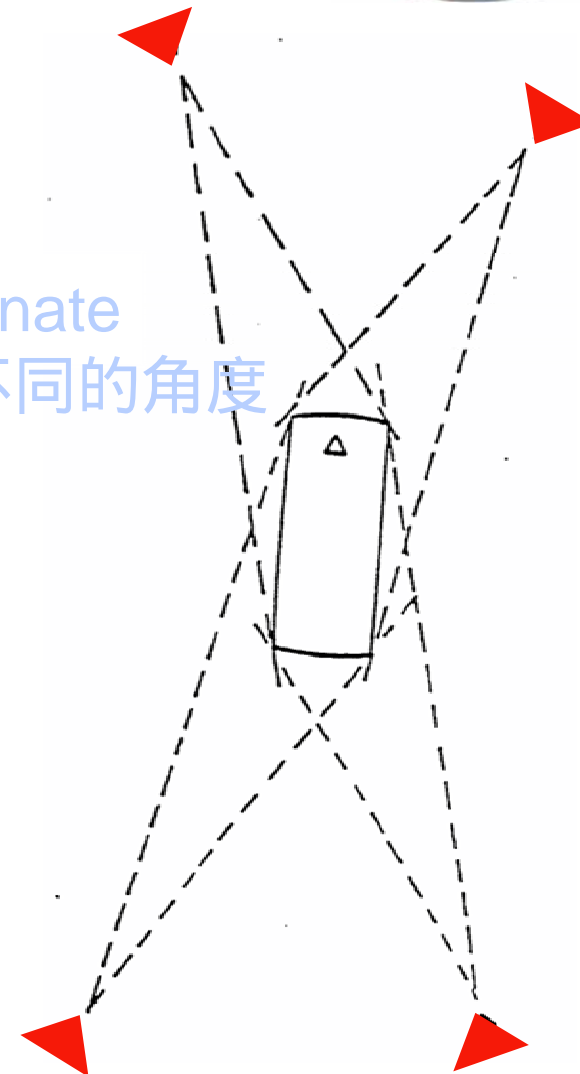
- Taking a picture and photographing a specific item are two different things. 简单的照相和拍摄具体的事物是两件不同的事情
- Take pictures of the accident scene at distances to cover the whole scene from all four sides.  
远距离拍摄事故现场，以覆盖整个现场的四周。
  - ✓ Determine direction of vehicles and tire marks  
确定车辆和轮胎标记的方向
  - ✓ Final resting point of vehicles 车辆最终停下来点
  - ✓ Establish lane markings and traffic control devices.  
建立车道标志线和交通管制设施
- Photograph specific items up close. 拍摄特定的项目
  - ✓ Interior of vehicles / instrument panels / operating controls.  
车辆的内部/仪表板/运行控制
  - ✓ Point of impact, fluid, gouges, and scratches on pavement.  
公路上留下的碰撞点，流体，沟及刮痕
  - ✓ Debris— short lived evidence and if not documented immediately any information it provides can be lost.  
碎片—不起眼的证据，但如果不被立即收集，它所能提供的信息将丢失



# Taking a Picture vs. Photography 照相和拍摄



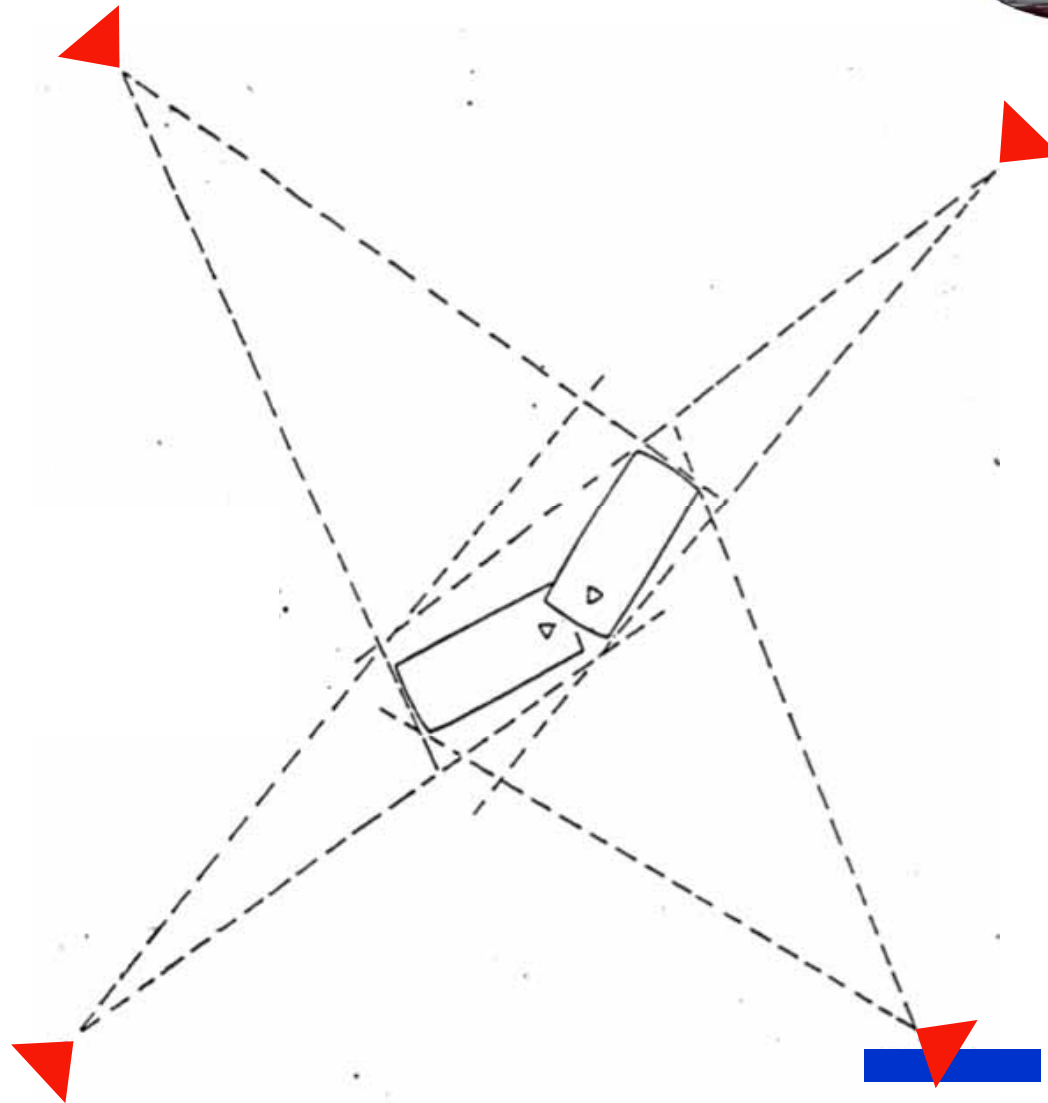
Alternate Method 不同的角度



Camera

AIGA 2006 MEETING

photos  
in four corners of Venice



Camera

AIGA 2006 MEETING



# Photograph of Instrument Panel 仪表板的拍摄





## Photograph of Instrument Panel 仪表板的拍摄



## Photograph of Instrument Panel 仪表板的拍摄



## On Board Data Recorders 车上的数据记录器



- **APCI currently uses PDT. APCI目前使用PDT**
- **If possible hit the incident button and extract information. 可能的话，敲击事故按钮以撷取资料**
- **Put PDT in safe place to be brought back to terminal to be uploaded. 把PDT放置于安全的地方，带回到终端以便上传信息**
- **In serious accidents where PDT recovery is impossible, the on board engine ECM should be recovered and sent for analysis. 对严重的事故，如PDT无法恢复，车上的发动机ECM必须要复原以供分析**

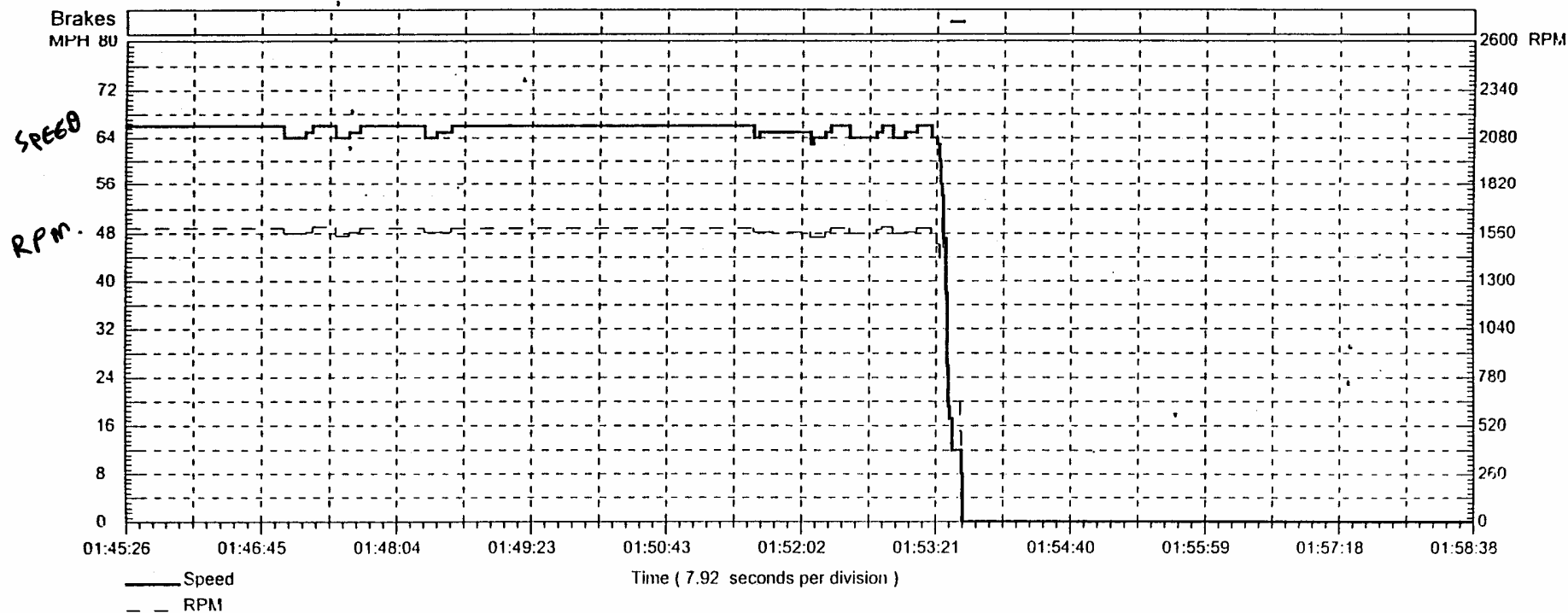


Vehicle Event Report

Activity Number: 32  
Detailed Data At: 9/28/2000 01:58:38

Data Sample Rate: 1 Second Between Samples  
Shortest Recorded Duration: 1 second

Cause : Power Down  
Graph Number 2 of 2





# Air Products & Chemicals, Inc.

Home Office  
7201 Hamilton Blvd  
Allentown, PA 18195

Date : 5/13/2003  
Vehicle : 330652  
Odometer : 431882.9

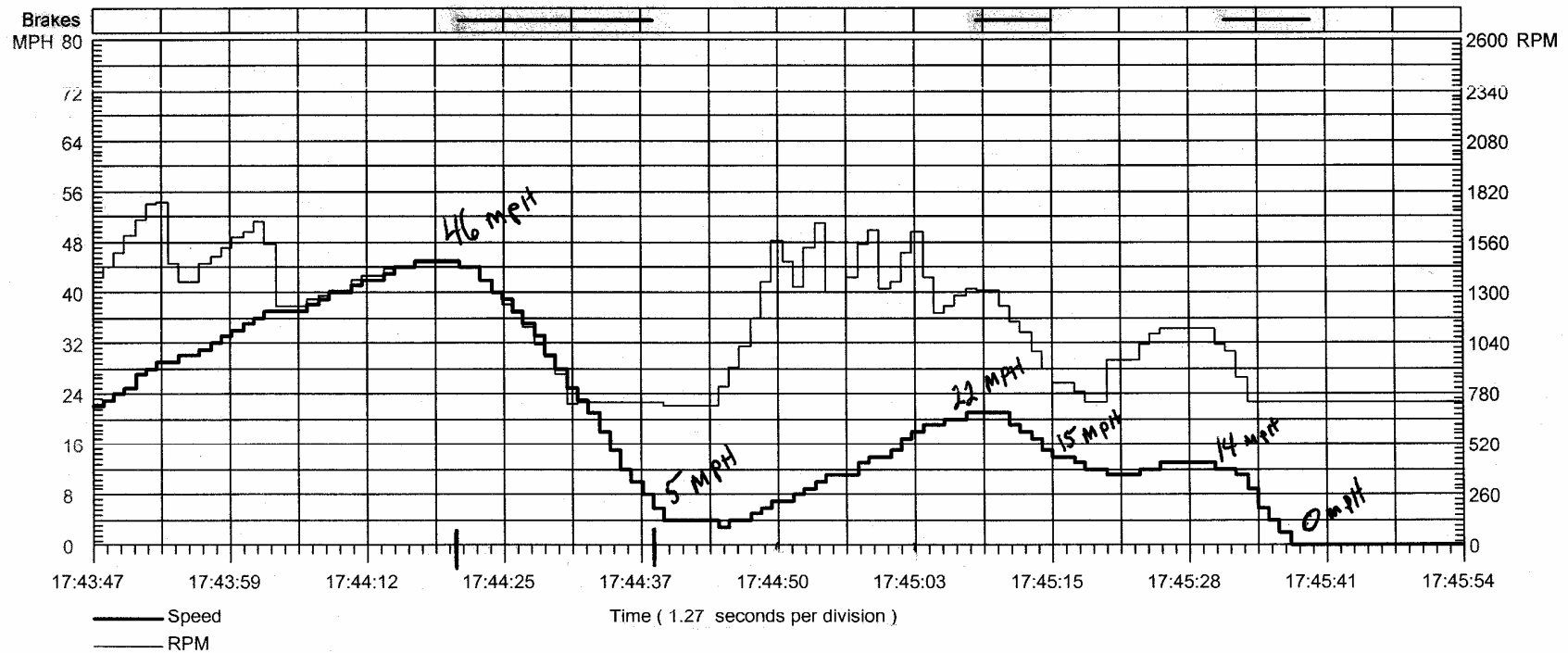
## Vehicle Event Report

Driver:

Activity Number: 137  
Detailed Data At: 5/12/2003 17:45:54

Data Sample Rate 1 Second Between Samples  
Shortest Recorded Duration: 1 second

Cause : Driving Period End  
Graph Number 1 of 1



Unit #:

5579

CX613-5597

## 2 Tenths Sec

Incident Date:

9/28/00 2:49:21AM

Time	Switch Status								Vehicle Speed	Engine Speed
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8		
3.80 sec before incident	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	56 mph	1350 RPM
3.60 sec before incident	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	55 mph	1590 RPM
3.40 sec before incident	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	54 mph	1870 RPM
3.20 sec before incident	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	54 mph	1980 RPM
3.00 sec before incident	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	54 mph	1890 RPM
2.80 sec before incident	OFF	OFF	★ OFF	OFF	OFF	★ OFF	ON	OFF	54 mph	1780 RPM
2.60 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	53 mph	1710 RPM
2.40 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	52 mph	1650 RPM
2.20 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	50 mph	1600 RPM
2.00 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	49 mph	1510 RPM
1.80 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	47 mph	1480 RPM
1.60 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	45 mph	1410 RPM
1.40 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	44 mph	1370 RPM
1.20 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	42 mph	1310 RPM
1.00 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	40 mph	1260 RPM
0.80 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	38 mph	1200 RPM
0.60 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	37 mph	1160 RPM
0.40 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	36 mph	1110 RPM
0.20 sec before incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	34 mph	1080 RPM
Incident occurred	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	33 mph	1210 RPM
0.20 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	30 mph	660 RPM
0.40 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	22 mph	440 RPM
0.60 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	16 mph	510 RPM
0.80 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	14 mph	550 RPM
1.00 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	16 mph	640 RPM
1.20 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	18 mph	660 RPM
1.40 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	19 mph	680 RPM
1.60 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	20 mph	700 RPM
1.80 sec after incident	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	19 mph	640 RPM
2.00 sec after incident	ON	ON	ON	OFF	OFF	OFF	ON	OFF	19 mph	620 RPM
2.20 sec after incident	ON	ON	ON	OFF	OFF	OFF	ON	OFF	17 mph	670 RPM

Switch Names:

SW1= Service Brake

SW2= Park Brake

SW3= Clutch Pushed

SW4= Engine Brake Low Bank Engaged

SW5= Engine Brake High Bank Engaged

SW6= Cruise Control Status

SW7= Key Switch Status

SW8= Undefined

# Evidence Collection 证据的收集



- **Any evidence collected must be kept in its original form.** 任何收集的证据必须保存其原有的形态
- **Loose pieces of paper and/or unorganized methods of collection will come back to cause problems**  
文件的活块和/或无组织的收集方式将导致问题的出现
- **Keep organized records of measurements, witness accounts, and photos.** 保存对度量，证人和照片的有组织的记录
- **If retyped or rewritten, keep the original with it for litigation purposes.** 如果重打字或被重写，保留正本以供诉讼目的。

# Evidence Collection 证据的收集

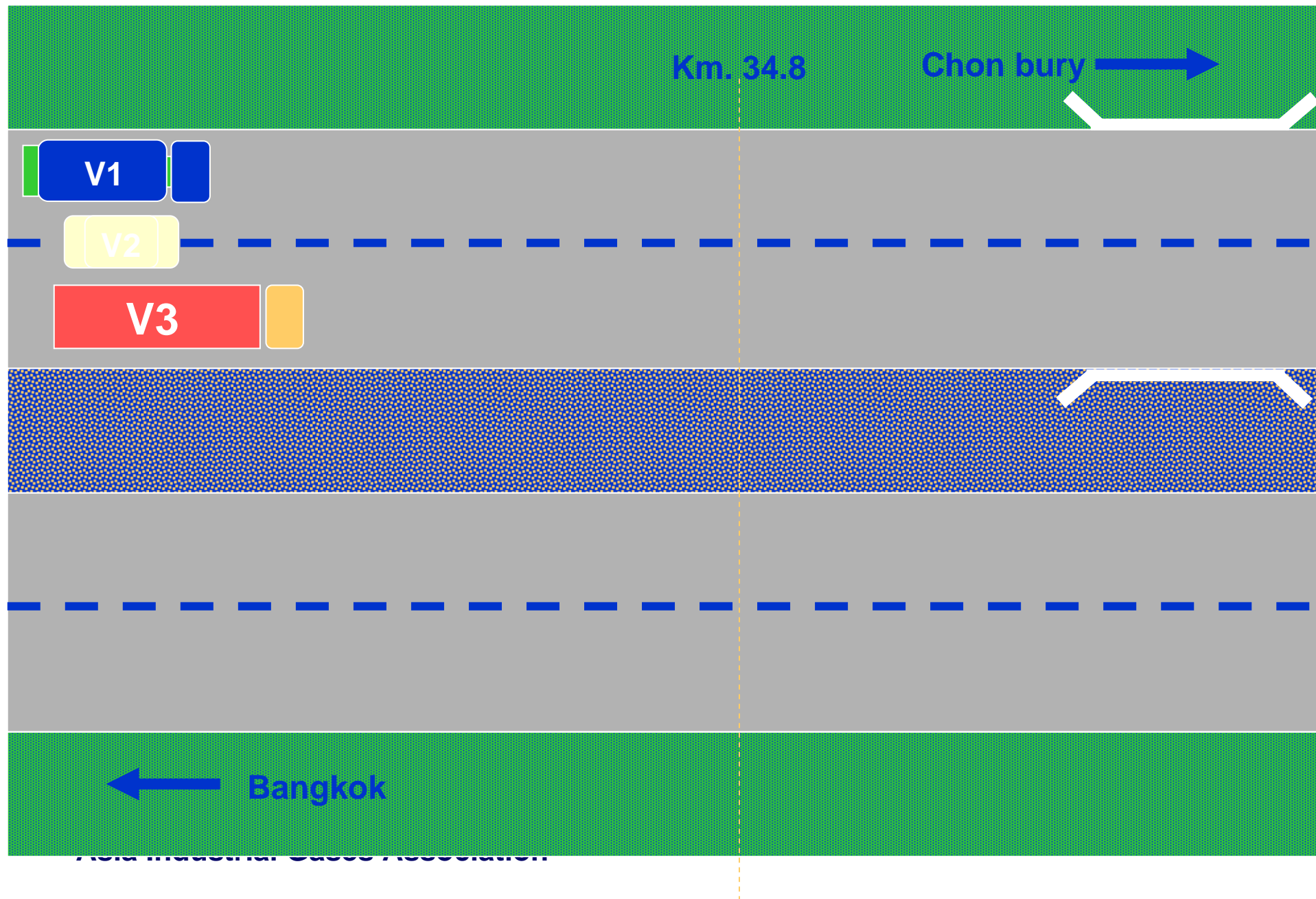


- **Reports for Infotrax and the Electronic Control Module on the power units are also evidence.**  
Infotrax报告和电器单元的电子控制模块也是证据所在
- **Any legal actions will usually take years to complete and this evidence will be gone over and over.** 任何的诉讼通常都将花费一年以上的时间来完成，所有的证据将被一次又一次地用上。

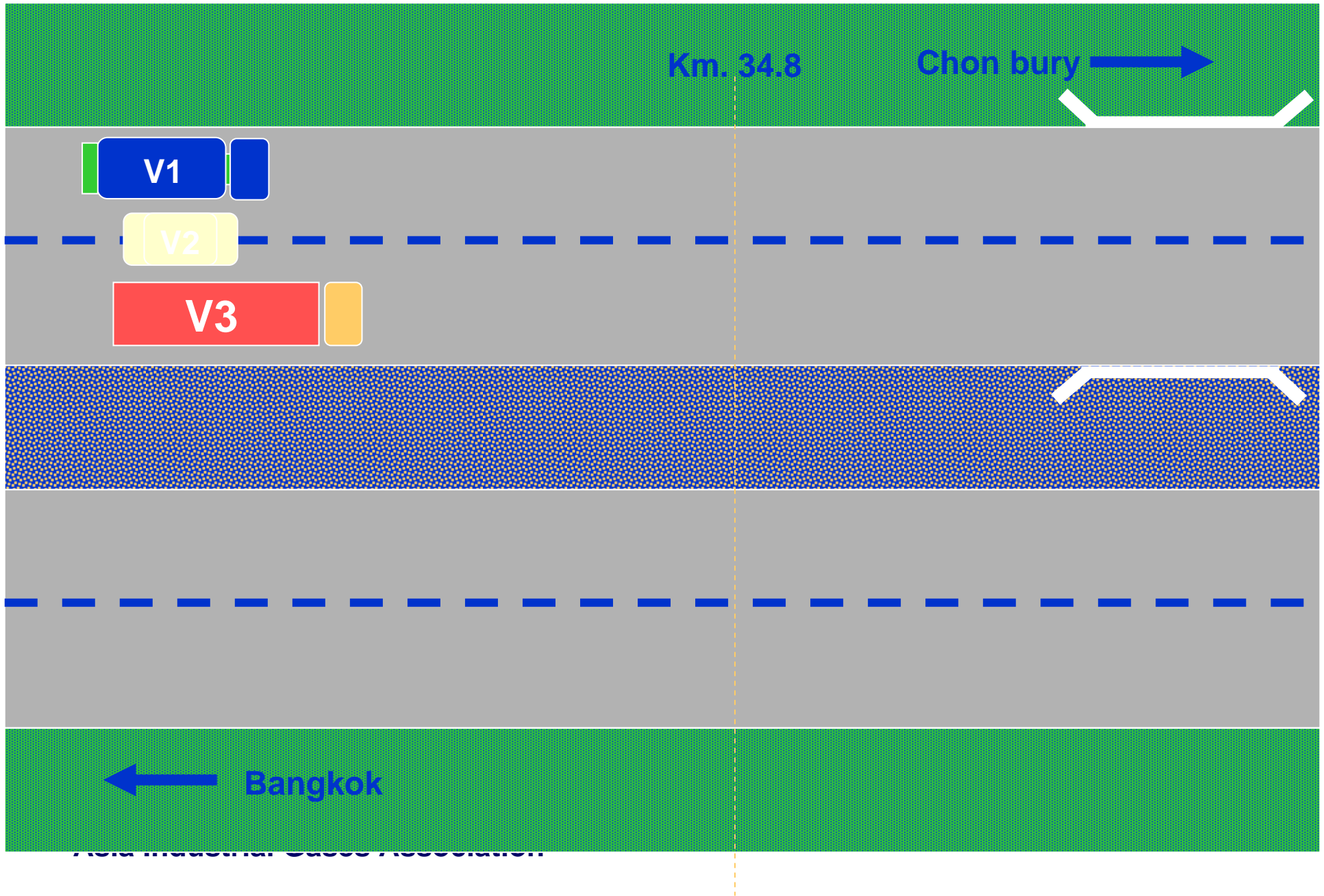
# Accident Sequence 事故次序



- From the information gathered, enact the accident sequence. 从采集的信息中, 制定事故的排序

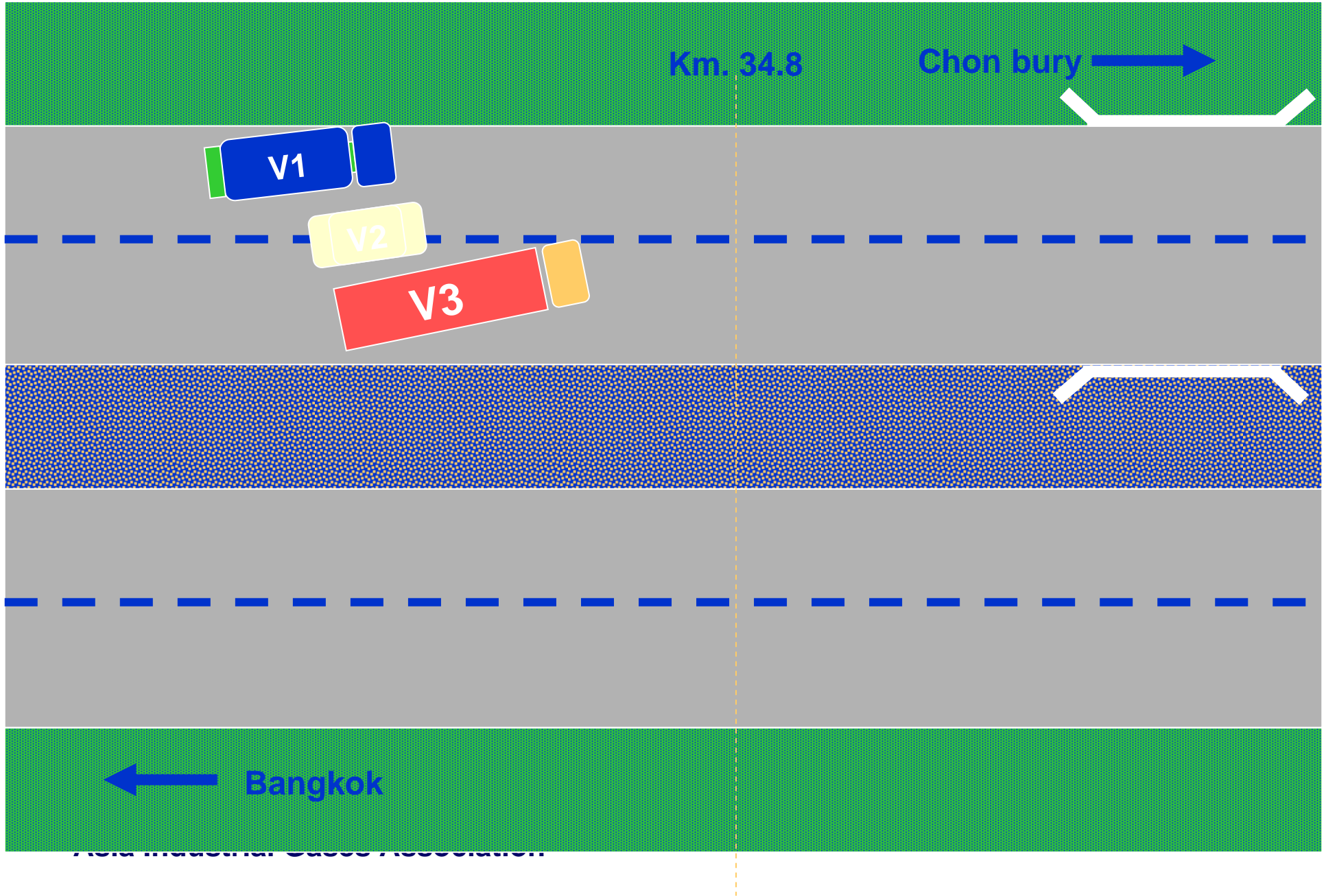


Area under the curve / acceleration

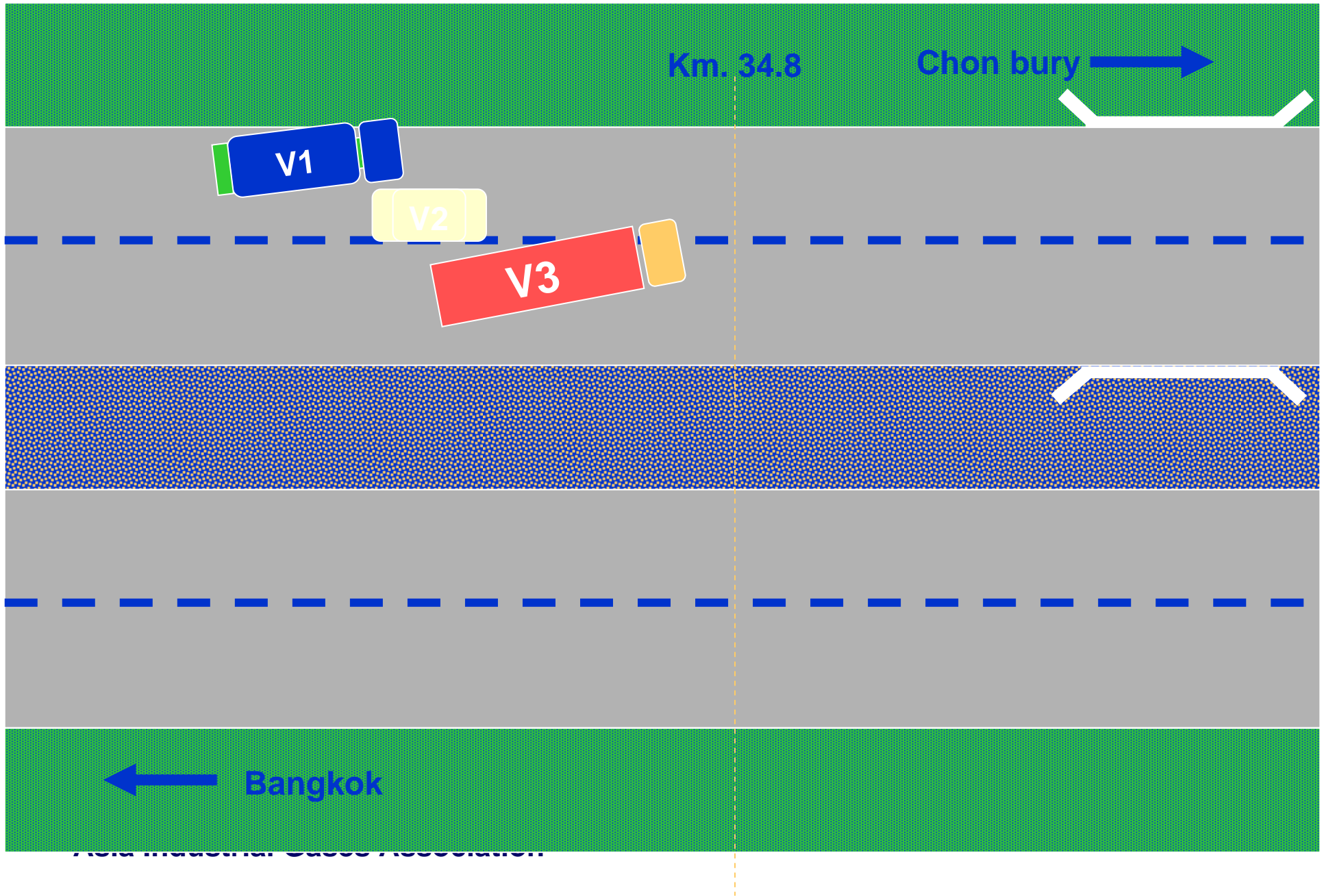


Field Incident Cases / Accidents

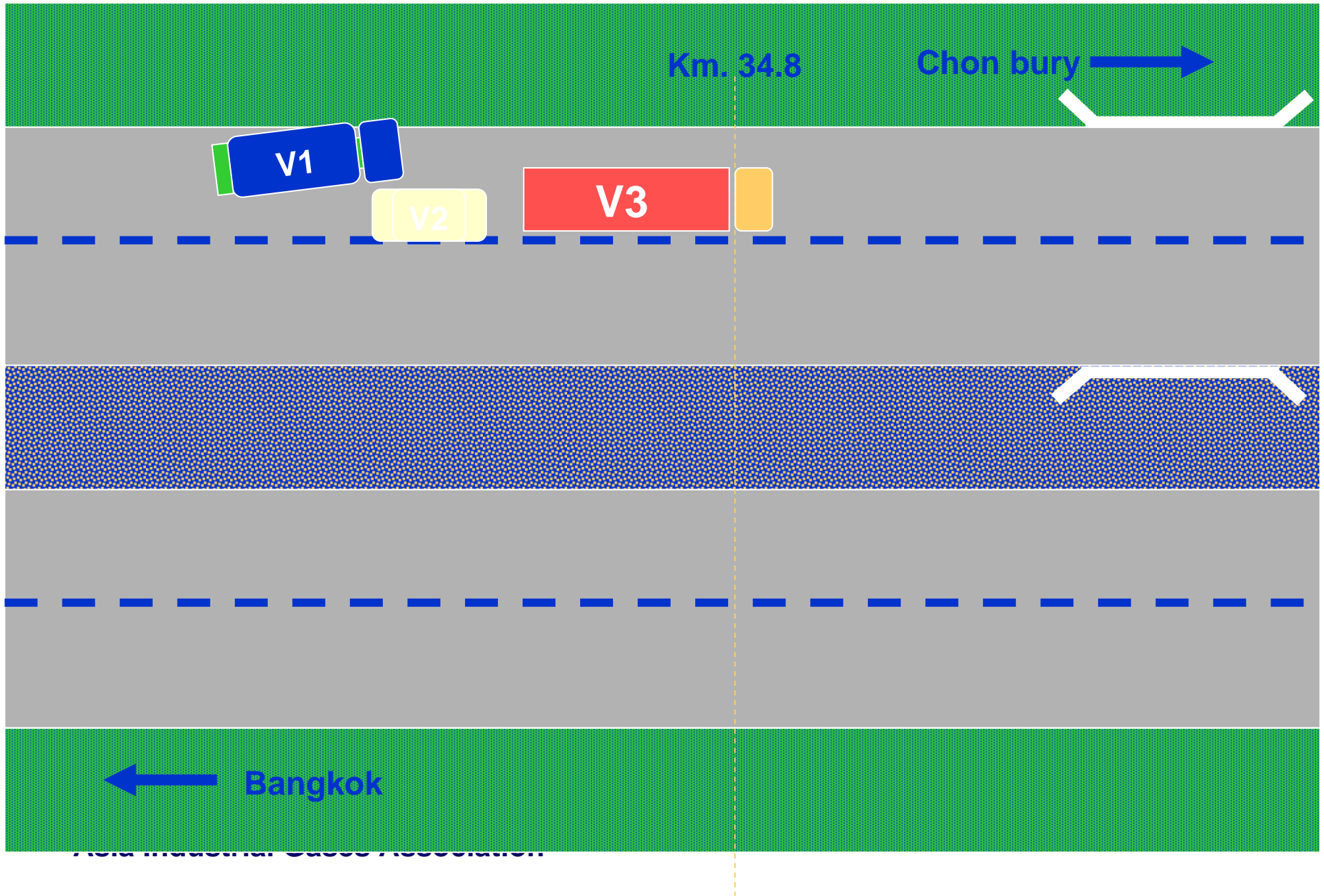




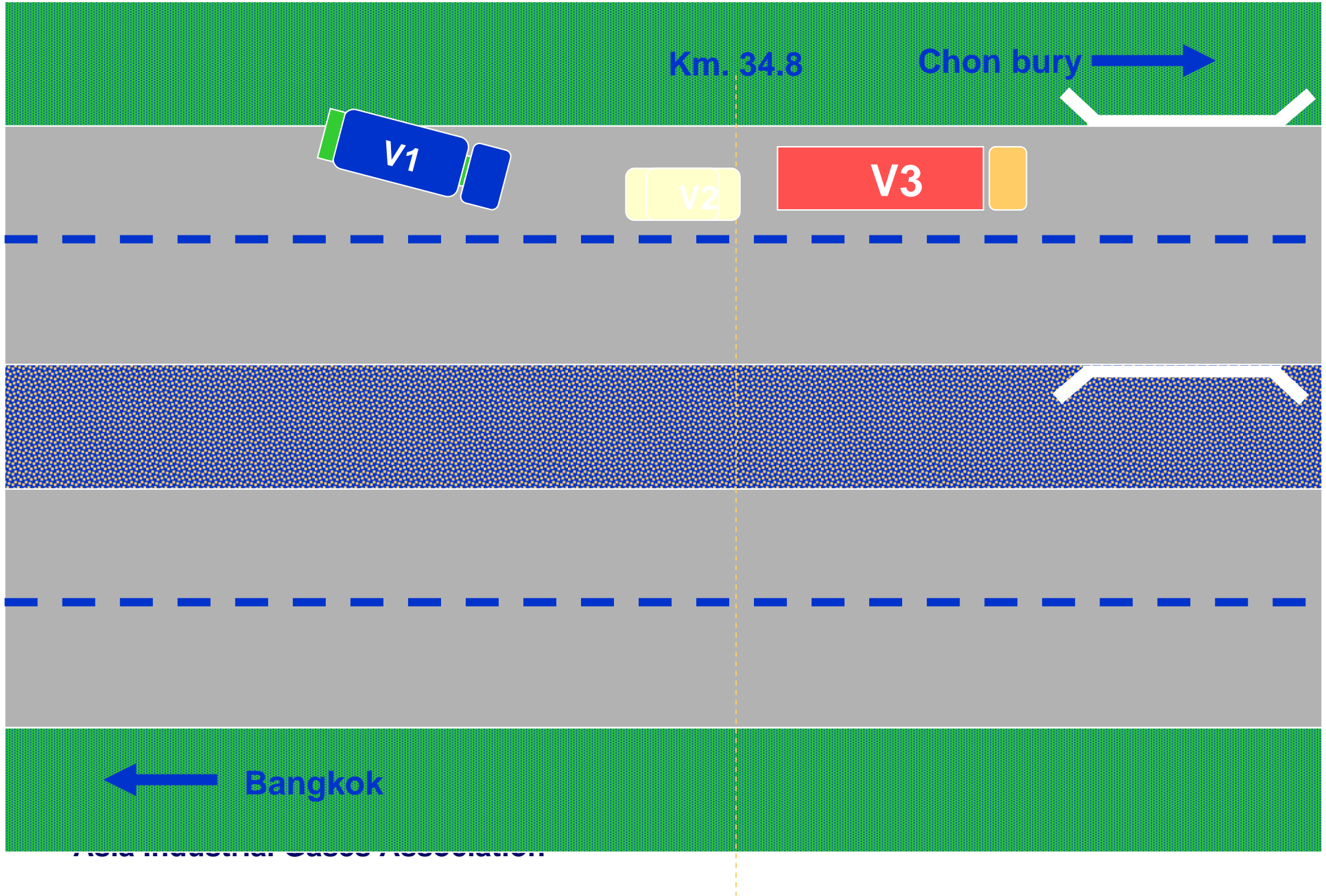
Real-World Cases / Accidents



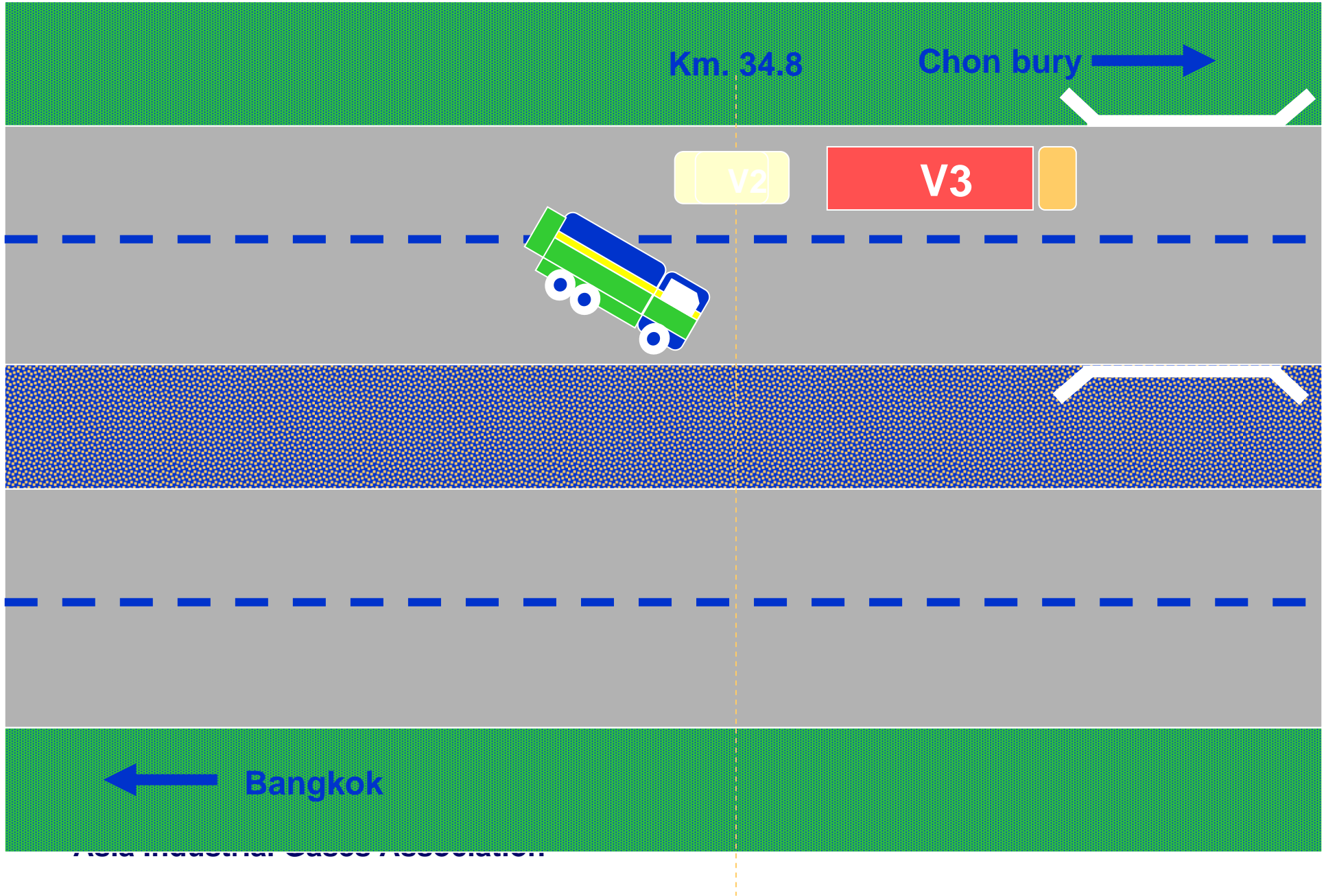
Field Incident Cases / Accidents



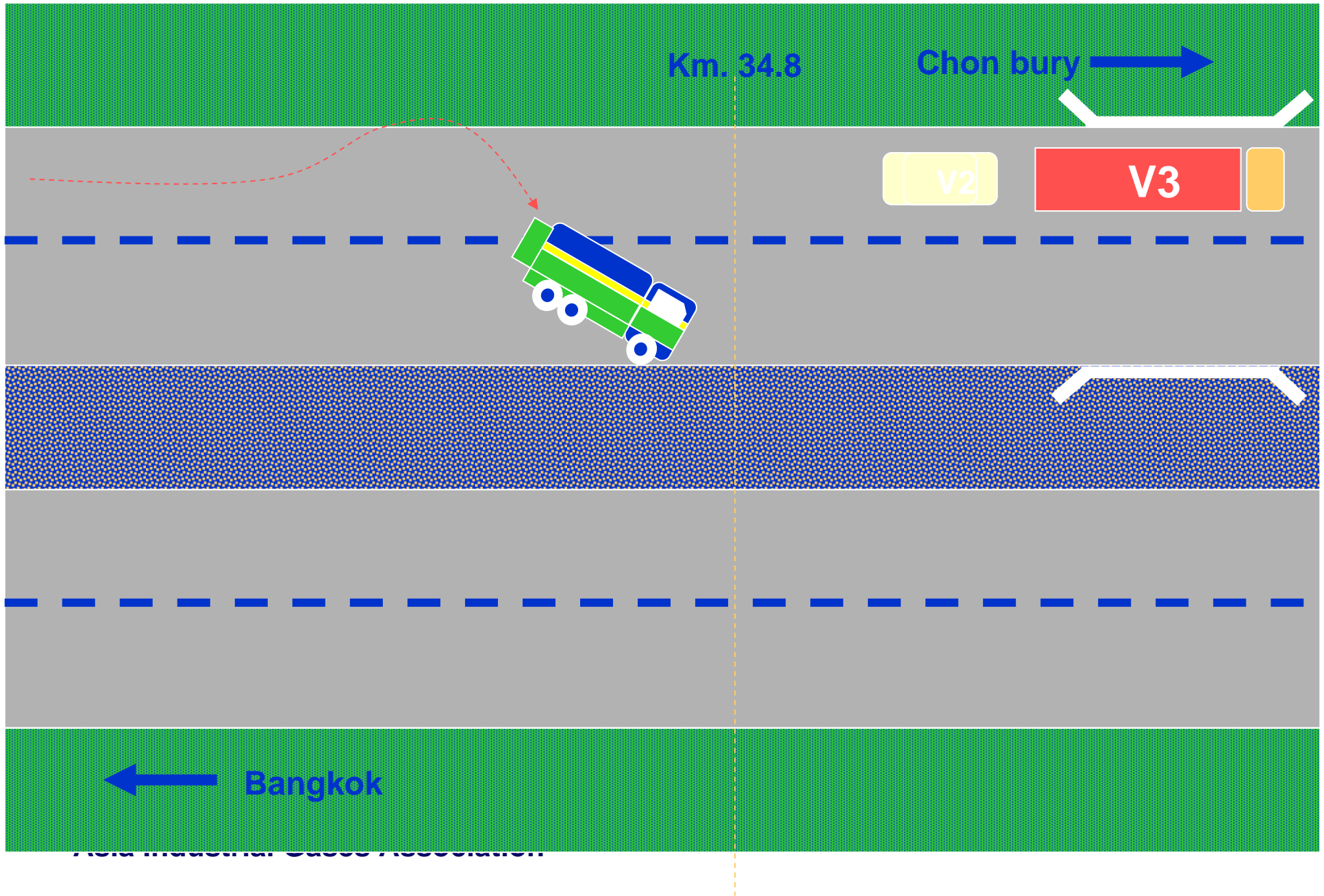
Field Incident Cases / Accidents



Field Incident Cases / Accidents



Field Investigation Cases / Accidents



Field Investigation Cases / Accidents







# Road Vehicle Recovery 道路交通恢复



**What do we need to have? 我们需要具备什么**

- **Vehicle Recovery Team(s) 交通恢复团队**
- **Qualified and Trained Personnel**  
有资质的受过培训的人员
- **Procedures 程序**
- **Techniques 技能**
- **Equipment 设备**



# Questions????

# 问题