

**CHEMICAL HYGIENE PLAN
VERMONT AGENCY OF TRANSPORTATION
MATERIALS AND RESEARCH SECTION**

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SECTION 100.000--PURPOSE

Development of this plan will allow Materials and Research to comply with 29 CFR Part 1910.1450. This document was developed to provide employees working under the direction of the Materials and Research Engineer awareness and guidance when working with hazardous chemicals in association with their job functions within the Materials and Research (M&R) Section. In addition, this plan is to ensure that employees of the Materials and Research Section will not be exposed to substances in excess of the Permissible Exposure Limits (PEL) as set forth in 29 CFR Part 1910 established by the Occupational Safety and Health Act (OSHA).

SECTION 100.005--DEFINITIONS

In addition to the definitions listed in 29 CFR 1910.1450(b) [See Appendix A], the following applies to this document:

Agency - Vermont Agency of Transportation

SECTION 100.010--RESPONSIBILITIES

The responsibility to maintain chemical hygiene belongs to everyone within the M&R Section; however, there are certain positions that must be held responsible for particular aspects of this plan.

The responsibilities listed below conform to the suggestions found in 29 CFR 1910.1450, Appendix A. These may change in the future after implementation has taken effect.

- A. The Materials and Research Engineer has the ultimate responsibility for chemical hygiene within M&R and must, with other staff, provide continuing support for the Materials and Research Section Chemical Hygiene Plan.

- B. The Research and Testing Engineer, the Materials Engineer and the Soils and Foundations Engineer will be responsible for chemical hygiene in their respective areas.

SECTION 100.010--RESPONSIBILITIES (continued)

- C. The Materials & Research Section Chemist will be the Chemical Hygiene Officer (CHO). The CHO must:
- i. Work with the supervisors and other employees to develop appropriate chemical hygiene policies and practices for presentation to the Chemical Hygiene Committee (see 'G' of this section for committee makeup) for approval and subsequent implementation;
 - ii. Monitor procurement, use, inventory and disposal of chemicals used in M&R;
 - iii. See that appropriate audits are maintained;
 - iv. Aid the Safety Coordinator to develop precautions, ongoing safety training and adequate facilities; and
 - v. Know the current regulatory requirements regarding hazardous chemicals.
- D. The Safety Coordinator will work closely with the CHO in regard to safety and training issues. The Safety Coordinator will also chair the Chemical Hygiene Committee.
- E. Unit supervisors have overall responsibility for chemical hygiene in their work areas, including responsibility to:
- i. Ensure that workers are aware of and follow the chemical hygiene rules, that personal protective equipment is available and in working order and is used, and that appropriate training has been provided;
 - ii. Provide regular, formal chemical hygiene and housekeeping inspections, including routine inspections of emergency equipment;
 - iii. Know the current regulatory requirements regarding hazardous chemicals including the safe handling, labeling, and proper storage of all hazardous chemicals; and the maintaining, and understanding of all Materials Safety Data Sheets (MSDS);

SECTION 100.010--RESPONSIBILITIES (continued)

- iv. Determine the required levels of personal protective equipment. Appendix B provides a listing of the personal protective equipment requirements for each laboratory within the Materials and Research Section;
 - v. Work with the CHO and Safety Coordinator to ensure that the facilities and training in regard to chemical hygiene are adequate; and
 - vi. Review and update standard operating procedures in their units.
- F. Materials and Research Section workers are responsible for:
- i. Reading the current Chemical Hygiene Plan and MSDSs in his or her work area and signing the verification forms;
 - ii. Planning and conducting each operation in accordance with the
Chemical Hygiene Plan; and
 - iii. Developing good personal chemical hygiene practices.

SECTION 100.015--STANDARD OPERATING PROCEDURES

The Standard Operating Procedures (SOPs) will incorporate safety and health information to provide the necessary guidance in regard to the safe laboratory use of chemicals. Each laboratory will have its own specific SOPs based on the various tests being performed. Appendix B provides a reference to the SOPs.

In general, all laboratories should abide by the “Basic Rules and Procedures for Working with Chemicals”, presented in Appendix C. All hazardous chemicals should not only be stored in proper receptacles and containers, but also be kept locked up during non-working hours.

SECTION 100.020--CRITERIA FOR USE OF CONTROL MEASURES TO REDUCE EXPOSURE TO HAZARDOUS CHEMICALS

Minimizing the employee's exposure to hazardous chemicals in the workplace should be the Agency's and M&R's main goal in reference to this Chemical Hygiene Plan. M&R will measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

SECTION 100.023--MAINTENANCE OF ENGINEERING CONTROLS

A laboratory inspection and maintenance sheet has been developed, (see Appendix E) for each lab. Each unit supervisor will use the sheet to perform quarterly inspections to ensure that all mechanical systems are functioning adequately. The maintenance form is designed to log dates of inspection, deficiencies and corrective actions taken.

SECTION 100.025--TRAINING AND PROVISION OF INFORMATION

Initial training and provision of information will occur during the orientation period for new employees and prior to changing or shifting of work assignments for current employees. The CHO, Safety Coordinator and unit supervisors will discuss the work assignments, chemicals involved (including action levels, permissible exposure limits, signs and symptoms), the Chemical Hygiene Plan, SOPs, MSDSs, personal protective equipment, etc. with the employee prior to him or her working with chemicals in a laboratory. Documentation of this initial training will be distributed to all the parties involved, with the CHO responsible for the recording, distributing, and filing of this

SECTION 100.025--TRAINING AND PROVISION OF INFORMATION continued

documentation. Additional training may evolve from the monthly safety meetings, separate safety and training courses, as well as from refresher courses offered throughout the year.

- G. The Chemical Hygiene Committee shall consist of the Safety Coordinator, the Research and Testing Engineer, the Chemical Hygiene Officer, the AOT Hazardous Material and Waste Coordinator and the AOT Safety Officer, with the Safety Coordinator acting as the chairperson. This committee will be responsible for the following:
- i. Perform an annual review of the Chemical Hygiene Plan and act on presentations regarding chemical hygiene policies, procedures and practices submitted by the CHO;
 - ii. Present major facility modifications and other expenditures to the Materials and Research Engineer that are necessary for M&R to be in compliance with 29 CFR 1910.1450;
 - iii. Process employees' requests for medical exams under the provisions of 29 CFR 1910.1450; and
 - iv. Perform any other review functions that may develop throughout the year.

The CHO and Safety Coordinator will develop a training program regarding chemicals used in the laboratories. The unit supervisors will be responsible for conformance with the SOPs for his or her particular area.

SECTION 100.030--PRIOR APPROVAL FOR SPECIFIC LABORATORY OPERATIONS

Prior to any work starting, the CHO must approve any operations that involve hazardous chemicals for which there are no approved SOPs available. The affected unit will have to present SOPs that address all elements of chemical safety in the laboratory to the Chemical Hygiene Committee for review and approval at its next scheduled meeting. Once the Committee has approved the SOPs, they will be included in the Chemical Hygiene Plan

SECTION 100.035--MEDICAL CONSULTATION AND EXAMINATION

- A. The Agency shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:
 - i. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.
 - ii. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
 - iii. Whenever an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for a medical examination.
- B. All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.
- C. Information provided to the physician. The Agency shall provide the following information to the physician:
 - i. The identity of the hazardous chemical(s) to which the employee may have been exposed;
 - ii. A description of the conditions under which the exposure occurred, including quantitative exposure data, if available; and
 - iii. A copy of the MSDS for the chemical(s) in question.
 - iv. A description of the signs and symptoms of exposure that the employee is experiencing, if any.

SECTION 100.035--MEDICAL CONSULTATION AND EXAMINATION continued

- D. Physician's written opinion. For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:
- i. Any recommendation for further medical follow-up;
 - ii. The results of the medical examination and any associated tests;
 - iii. Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace; and
 - iv. A statement that the employee has been informed by the physician of the results of the consultation or medical examination, and of any medical condition that may require further examination or treatment.

The written opinion shall not reveal specific findings or diagnoses unrelated to occupational exposure.

SECTION 100.040--HAZARD IDENTIFICATION

A. Container Labeling:

The CHO and unit supervisors will verify that all containers received will be clearly labeled as to contents, and be accompanied by a hazard warning, listing of the name and address of the manufacturer and a MSDS, all of which must be made available to employees.

The CHO and unit supervisors will make sure that all secondary containers are labeled with either an extra copy of the original manufacturer's label or with generic labels which have a block for identity and blocks for the hazard warning. Stationary process containers will have a sign indicating the appropriate hazard warning, and a copy of the MSDS shall also be posted in the work area. The Agency's Hazardous Materials and Waste Coordinator may be contacted to provide assistance in labeling.

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SECTION 100.040--HAZARD IDENTIFICATION continued

B. Material Safety Data Sheets

The CHO has the responsibility of maintaining the MSDS system for M&R. The master listing will be kept in a yellow three ring binder, labeled "MATERIAL SAFETY DATA SHEETS" in the Administrative Unit (Main Office). In addition, a copy of a pertinent MSDS will be kept in the appropriate laboratory, for each chemical in that area.

Before any hazardous chemical is accepted within M&R, the MSDS shall be included with, or accompanied by, the container. In addition, products submitted for evaluation by M&R shall include return shipping labels and postage so that the material may be returned to the original owner. The CHO will check the MSDS against the current listing noting any changes. The CHO will then request that the MSDS be read by the employee(s) and will provide a copy for the work area. The employee(s) will then sign the verification form after the employee(s) has read and understood the relevant sections of the MSDS.

SECTION 100.045--RECORD KEEPING

M&R will maintain an accurate record for each employee of any measurements taken to monitor employee exposures and to document any medical consultations and examinations that were performed in accordance with Section 100.035.

SECTION 100.050--CONSUMPTION OF FOOD AND BEVERAGES

No employee or visitor shall be allowed to consume food or beverages in any laboratory areas where chemicals are used or stored. (Reference OSHA Subpart J, Standard 1910.141, (g) (2)).

SECTION 100.055--SPILLS, ACCIDENTS, AND WASTE DISPOSAL

Please refer to the AOT Central Garage Hazardous Waste Material Emergency Contingency Plan & Emergency Response Plan. A copy can be acquired from the Chemical Hygiene Officer (CHO) and the Safety Coordinator in the Materials & Research Section.

APPENDIX A PAGE A1

Occupational Safety and Health Administration (OSHA) Standard 1910.1450

OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES

Synopsis of OSHA regulations:

A. Scope and application - Applies to all employers engaged in the laboratory use of hazardous chemicals.

B. Abridged definitions -

Action Level: A concentration level for a specific substance which initiates certain required activities such as exposure monitoring and medical surveillance.

Assistant Secretary: Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor.

Chemical Hygiene Officer: Designated by employer, qualified by training or experience.

Chemical Hygiene Plan: A written program developed and implemented by the employer.

Combustible liquid: Any liquid having a flashpoint at or above 100° F. (37.8°C) but below 200°F (93.3°C).

Compressed gas: 1) A gas or mixture of gases having an absolute pressure exceeding 40 psi at 70°F.
2) A gas exceeding 104 psi at 130°F.
3) A liquid having vapor pressure exceeding 40 psi at 100°F

Emergency: Any occurrence which results in an uncontrolled release of a hazardous chemical into the workplace.

APPENDIX A PAGE A2

**OSHA Standard 1910.1450
OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN
LABORATORIES (continued)**

Employee: Any individual employed in a laboratory workplace who may be exposed to hazardous chemicals, in the course of his or her assignments.

Explosive: A chemical that causes a sudden release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Flammable: A chemical that falls into one of these categories: aerosol flammable, gas, flammable, liquid flammable.

Flammable Liquid: Any liquid having a flashpoint below 100° F (37.8° C).

sufficient Flashpoint: Minimum temperature at which a liquid gives off a vapor in concentration to ignite.

Hazardous Chemical: A chemical for which there is enough statistical evidence that acute or chronic health effects may occur in exposed employees.

Permissible Exposure Limit (PEL): The maximum concentration (defined by OSHA), of a chemical averaged over 8 hours, to which 95% of healthy adults can be repeatedly exposed 8 hours per day, 40 hours per week. If the PEL is exceeded, respiratory protection is mandatory.

Threshold Limit Value (TLV): The concentration of a chemical in air to which nearly all individuals can be exposed 8 hours per day over extended periods of time without adverse effects.

- C. Permissible exposure limits: The employer shall assure laboratory employees' exposures to hazardous substances do not exceed the permissible exposure limits specified in 29 CFR Part 1910, Subpart Z.

APPENDIX A PAGE A3

**OSHA Standard 1910.1450
OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES
(continued)**

- D. Employee exposure determination: If there is reason to believe that exposure levels exceed the permissible exposure limits, the employer shall conduct an initial monitoring of any substance regulated by a standard, conduct periodic monitoring if the exposure exceeds the PEL, terminate the monitoring, and notify the employee of the monitoring results.
- E. Chemical hygiene plan - General: The employer shall develop and carry out the provisions of a written chemical hygiene plan.
- F. Employee information and training: The employer shall provide employees with information and training to ensure they are aware of hazards of chemicals present.
- G. Medical consultation and medical exams: The employer shall provide all employees who work with hazardous chemicals medical attention including follow-ups.
- H. Hazard identification: This includes labels and material safety data sheets.
- I. Use of respirators: Where it is necessary to maintain exposure below permissible exposure limits, the employer shall provide proper respiratory equipment and training in its use. This is in accordance with 29 CFR 1910.134.
- J. Record keeping: The employer shall keep accurate records for all employees of any measurements taken to monitor employee exposures, including any medical records.
- K. Dates: This section became effective May 1, 1990.

Note: A complete copy of OSHA Standard 1910.1450-
"Occupational Exposure to Hazardous Chemicals
in Laboratories" is available from the Chemical
Hygiene Officer (CHO) in the M&R Section.

APPENDIX B PAGE B1

References for Standard Operating Procedures (SOP) and Hazard Assessment:

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Aggregate Lab	B3-B4
Analytical Lab / Still Room	B5-B7
Asphalt Cement Lab	B8-B9
Bituminous Concrete Lab	B10-B12
Cement Lab / Tinius Room	B13-B14
Concrete Lab	B15-B19
Drillers	B20-B21
Independent Assurance Unit	B22-B24
Research & Development Unit	B25-B26
Soils Lab	B27-B28

Reference for Hazard Assessment Codes:

Personal Protective Equipment and Other Protective Measures

<u>CODE</u>	<u>DESCRIPTION</u>
FW	Full Coverage Footwear
GH	Hot Gloves
GR	Rubber Gloves
GRE	Insulated Rubber Gloves (Voltage Rated)
GN	Nitrile Gloves
GW	Work Gloves
H	Hearing Protection
HH	Hard Hat / Orange Cap
Hood	Hood
LC	Lab Coat
NO	No Loose Clothing
Radiation Badge	Radiation Badge
RESP	Respirator
STB	Steel-Toed Boots
SG	Safety Glasses / Goggles
SGF	Safety Face Shield (worn over glasses or goggles)
TV	Tyvek Suit
V	Vest
Vent	Ventilation

APPENDIX B PAGE B2

ADMINISTRATIVE OFFICE AREA

MATERIALS / CHEMICALS USED (Trade Name)

Accuduster

Expo Cleaner For Dry Erase Surfaces

Liquid Paper Correction Fluid

Rubber Cement

Stamp Pad Inks

Toner, Copier & Fax & Printer

Toner, Color Printer

UniSan Dry Air Freshener

X-Stamper Ink

APPENDIX B PAGE B3

AGGREGATE LAB

TESTS

- AASHTO T2 / ASTM D75
- AASHTO T11 / ASTM C117
- AASHTO T19 / ASTM C29
- AASHTO T21 / ASTM C40
- AASHTO T27 / ASTM C136
- AASHTO T37 / ASTM D546
- AASHTO T84 / ASTM C128
- AASHTO T85 / ASTM C127
- AASHTO T96 / ASTM C131
- AASHTO T104
- AASHTO T112 / ASTM C142
- AASHTO T248 / ASTM C702
- AASHTO T255 / ASTM C566-89
- VAOT - MD 22
- VAOT - MD 23

CHEMICALS (Trade Name)

- Barium Chloride
- Crystalline Silica (aggregate samples)
- Ferrous Sulfate
- Hydraulic Oil (in Gilson testing shaker)
- Mercury
- Sodium Hydroxide
- Sodium Sulfate

APPENDIX B PAGE B4

<u>TEST</u>	<u>NAME</u>	<u>AGGREGATE LAB</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 2-91	Sampling of Aggregates		Quarries, Heavy Objects, Noise	HH, STB, GW, H
T 11-91	Materials Finer than 75mm (No.200 Sieve) in Mineral Aggregates by Washing		Oven, Dishwasher Detergent	GH, SG, LC
T 19-93	Unit Weight and Voids in Aggregate		Oven, Heavy Objects	GH, GW, STB
T 21-91	Organic Impurities in Fine Aggregates for Concrete		Sodium Hydroxide	SG, GN
T 27-93	Sieve Analysis of Fine and Coarse Aggregates		Oven, Dust, Heavy Objects, Noise	GH, H, STB, Vent
T 37-95	Sieve Analysis of Mineral Filler for Road and Paving Materials		Oven, Dust, Heavy Objects, Noise	GH, H, STB, Vent
T 84-95	Specific Gravity and Absorption of Fine Aggregate		Oven, Glass	GH
T 85-91	Specific Gravity and Absorption of Coarse Aggregate		Oven	GH
T 96-92	Resistance to Abrasion of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine		Moving Drum, Noise, Heavy Objects, Oven, Dust	STB, H, GH, NO, Vent
T 104-92	Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate		Sodium Sulfate or Magnesium Sulfate, Barium Chloride	SG, GN
T 112-91	Clay Lumps and Friable Particles in Aggregate		Oven	GH
T 248-95	Reducing Field Samples of Aggregate to Testing Size		Heavy Objects, Dust	STB, Vent
T 255-92	Total Moisture Content of Aggregate by Drying		Oven	GH
VT AOT MRD 22	Determination of Thin and/or Elongated Particles in Coarse Aggregate			
VT AOT GR, Vent MRD 23	Determination of Coarse Aggregate Particles with Fractured Faces		Thermometers, Mercury	SG,

Appendix B Page B5
Analytical Lab

TESTS: AASHTO T-105, T-288, T-289, T-290, T-291, T-299.
ASTM D562, D711, D1155, D1214, D1475.

CHEMICALS USED:

Acetic acid	Nitric acid
Acetone	No Count decontamination spray
Acid Fuchsin stain	pH buffer solutions
Ammonium carbonate	Phenolphthalein
Ammonium chloride	Portland cement
Ammonium hydroxide	Potassium chloride
Ammonium nitrate	Potassium chromate
Ammonium oxalate	Potassium hydroxide
Ammonium phosphate	Potassium nitrate
Bacdown hand soap	Potassium permanganate
Barium chloride	2-Propanol (Isopropanol)
Calcium carbide	Rhodamine B Base stain
Calcium carbonate	Silver nitrate
Calcium chloride	Sodium carbonate
Clayton Yellow stain	Sodium chloride
Copper metal	Sodium cobaltinitrite
Copper sulfate	Sodium hydroxide
Ethanol, denatured	Sodium oxalate
Ethylene glycol	Sparkleen detergent
Formaldehyde	Stannous chloride
Glycerin	Staticide solution
Hexanes	Sulfuric acid
Hydrochloric acid	Talc (powder)
Indigo Carmine stain	Tetrahydroxyquinone stain
Iron metal (powder)	Tin metal
Latex paint	Toluene
Lead acetate	Trichloroethylene
Lead metal	Uranyl acetate
Magnesium metal	X-Ray Mix powder
Malachite Green stain	Xylenes
Mercuric chloride	Zinc metal
Mercury metal	
Methyl Orange stain	
Methyl Red stain	
Nickel metal	

APPENDIX B PAGE B6

ANALYTICAL LAB (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
AASHTO T-105	Chemical Analysis of Portland Cement	Muffle furnaces, open flames, cement dust, strong acids, strong Bases, oxidizers, flammable liquids, Irritating fumes.	Vent, SG, LC, Hood, GN, FW
AASHTO T-288	Minimum Soil Resistivity	Dust.	Vent, GN, LC,
AASHTO T-289	Soil pH	Dust, pH buffers.	Vent, GN, LC, SG
AASHTO T-290 LC,SG	Sulfate in Soil	Dust, Barium chloride, Muffle furnace.	Vent, Hood,
AASHTO T-291	Chloride in Soil	Dust, Silver nitrate.	Vent, LC, GN, SG
AASHTO T-299	ASR in Concrete-Uranyl Acetate Method	Dust, Uranyl Acetate	Vent, LC,GN, SG
ASTM D562	Viscosity of Paint	Latex Paint	LC, GN, SG
ASTM D711	No-Pickup Time	Latex Paint	LC, GN, SG
ASTM D1155	Roundness of glass Spheres	Dust	LC, GN, SG
ASTM D1214	Sieve Analysis of Glass Spheres	Dust	LC, GN, SG
ASTM D1475	Density of Paint	Latex Paint	LC, GN, SG

APPENDIX B PAGE B7
STILL ROOM

<u>TEST</u>	<u>NAME</u>	<u>HAZARDS</u>	<u>PPE CODES</u>
Xylene Reclamation by Distillation		Flammable liquids, Heat, Xylene vapor	LC, Vent, LG, RG, SG

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ASPHALT CEMENT LAB

TESTS

- AASHTO T40
- AASHTO T44/ ASTM D2042
- AASHTO T48/ ASTM D92
- AASHTO T49/ ASTM D5
- AASHTO T50/ ASTM D139
- AASHTO T53/ ASTM D36
- AASHTO T59/ ASTM D244
- AASHTO T72/ ASTM D88
- AASHTO T164/ASTM D2172
- AASHTO T170/ASTM D1856
- AASHTO T228/ASTM D70
- AASHTO T240/ASTM D2872
- AASHTO PP1
- AASHTO TP1
- AASHTO TP5
- AASHTO TP48

CHEMICALS USED (Trade Name)

- | | |
|-------------------------------|---|
| - Acetone | - Mercury |
| - Ammonium Carbonate | - Mineral Oil |
| - Antifreeze (in ATS DSR) | - Reagent Alcohol (in Bending Beam Apparatus) |
| - Asphalt Cements, All Grades | - Talc |
| - Asphalt PG Graded Binders | - Trichloroethylene |
| - Carbon Dioxide Gas | |
| - Chromerge Solution | |
| - Dura Board-fiberfrax | |
| -Formaldehyde | |
| - Glycerin | |
| - HG Absorb (in spill kit) | |
| - P-Xylene | |

APPENDIX B PAGE B9

ASPHALT LAB

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 40	Sampling Bituminous Materials	Hot Asphalt, Work Area, Anti-strip Additives	HH, STB, GH, LC, SGF,GN
T 44	Solubility of Bituminous Materials	Hot Asphalt, Trichloroethylene, Oven	GN, GH, SGF, LC
T 48	Flash and Fire Points by Cleveland Open Cup	Hot Asphalt, Open Flame, Anti-strip Additives	LC, SGF, GH, GN
T 49	Penetration of Bituminous Materials	Hot Asphalt, Anti-strip Additive	LC, SGF, GH, GN
T 50	Float Test for Bituminous Materials	Hot Asphalt, Anti-strip Additive	LC, SGF, GH, GN
T 53	Softening Point of Bitumen by Ring and Ball Apparatus	Glycerin, Ethylene Glycol, Silicon, Asphalt	GN, GH, SGF, LC
T 59	Testing Emulsified Asphalts	Xylene, Asphalt	GN, SGF, LC
T 72	Saybolt Viscosity	Xylene, Hot Asphalt	GN, GH, SGF, LC
T 164	Quantitative Extraction of Bitumens From Bituminous Paving Mixtures	Anti-strip Additives, VOC's, Trichloroethylene, Oven, Ammonium Carbonate	GH, GN, SGF, LC, SG, Hood
T 170	Recovery of Asphalt from Solution by Abson Method	Trichloroethylene, Asphalt, Anti-strip Additives, Open Flame, Explosion	SGF, LC, GH,GN, Hood
T 228	Specific Gravity of Semi-Solid Bituminous Materials	Hot Asphalt, Oven	SGF, LC, GH
T 240	Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)	Hot Asphalt, Oven	SGL, LC, GH
PP-1	Pressure Aging Vessel	Hot Oven, Hot Asphalt	GH, SGF, LC
TP-1	Bending Beam Rheometer	Reagent Alcohol, Glycerin, Talc	GN, SGF, LC

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**BITUMINOUS CONCRETE LAB
(Continued)**

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
TP-5	Dynamic Shear Rheometer	Hot Asphalt, Oven	GH, SGF, LC
TP- 48	Rotational Viscometer	Hot Asphalt, Oven	GH, SGF, LC

APPENDIX B PAGE B11
BITUMINOUS CONCRETE LAB (FIELD AND CENTRAL)

TESTS

- | | |
|--------------------------|---------------|
| - AASHTO T-2 | - VAOT MRD 1 |
| - AASHTO T-11 | - VAOT MRD 6 |
| - AASHTO T-27 | - VAOT MRD 10 |
| - AASHTO T-30 | - VAOT MRD 13 |
| - AASHTO T-40 | - VAOT MRD 14 |
| - AASHTO T-84 | - VAOT MRD 15 |
| - AASHTO T-85 | - VAOT MRD 22 |
| - AASHTO T-96 | - VAOT MRD 23 |
| - AASHTO T164/ASTM D2172 | |
| - AASHTO T-166 | |
| - AASHTO T-168 | |
| - AASHTO T-170 | |
| - AASHTO T-176 | |
| - AASHTO T-209 | |
| - AASHTO T-245 | |
| - AASHTO T-269 | |
| - AASHTO TP-4 | |

CHEMICALS USED (Trade Name)

- | | |
|------------------------------------|---------------------|
| - Asphalt Cements, All Grades | - Reagent Alcohol |
| - Calcium Chloride | - Trichloroethylene |
| - Dishwasher Detergent (Calgon) | - WD-40 |
| - Formaldehyde | - P-Xylene |
| - Hydrated Lime/Slaked Lime (CaOH) | |
| - Hydrochloric Acid 36-37% | |
| - Mercury | |
| - Motor Oil | |
| - 2-Propanol | |

APPENDIX B PAGE B12

BITUMINOUS CONCRETE LAB (FIELD AND CENTRAL) (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 2	Sampling Aggregates	Quarries, Heavy Objects, Noise	HH, STB, GW, H
T 11	Materials Finer than 75mm (No.200 Sieve) in Mineral Aggregates by Washing	Oven, Dishwasher Detergent	GH, SG, LC
T 27	Sieve Analysis of Fine and Coarse Aggregates	Oven, Dust, Heavy Objects, Noise	GH, Hood, STB, H
T 30	Mechanical Analysis of Extracted Aggregate	Oven, Dust, VOC's, Heavy Objects, Noise, Dishwasher Detergent	GH, Hood, H, SG, LC STB
T 40	Sampling Bituminous Materials	Work Area, Hot Asphalt, Splashing, Noise	SGF, LC, STB, HH, GH, H
T 84	Specific Gravity and Absorption of Fine Aggregate (C)	Oven	GH
T85	Specific Gravity and Absorption of Coarse Aggregate (C)	Oven	GH
T 96	Resistance to Abrasion of Small- Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (C)	Moving Drum, Noise Heavy Objects, Oven	STB, H, NO, GH
T 164	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures	Anti-strip Additives, Hot Bituminous Concrete VOC's, Trichloroethylene	SG, GH, GN, Hood, LC, SGF
T 166	Bulk Specific Gravity of Compacted		

Bituminous Mixtures Using Saturated
Surface-Dry Specimens

T 168	Sampling Bituminous Paving Mixtures	Hot Asphalt, Anti-strip Additives, Oven, Noise	SG, H, HH, GH, STB, LC
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APPENDIX B PAGE B13

BITUMINOUS CONCRETE LAB (FIELD AND CENTRAL) (CONTINUED)

T 170	Recovery of Asphalt from Solution by the Abson Method	Trichloroethylene, Asphalt, Anti-strip Additives, VOC's Heat, Explosion	SGF, LC, (C)GH, GN, Hood,
T 176	Plastic Fines in Graded Aggregates and Soil by use of Sand Equivalency Test	Calcium Chloride, Formaldehyde	GN, SG, LC
T 209	Maximum Specific Gravity of Bituminous Paving Mixtures	Hot Asphalt, Anti-strip Additives, Oven	SG, GH, LC
T 245	Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus	Oven, Asphalt, Anti-strip Additives, Heavy Objects, Noise	SG, STB, GH, H, LC
T 269	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures		
TP-4	Preparing and Determining the Density of HMA using the SHRP Gyrotory Compactor	Oven, Hot Asphalt, Heavy Objects	GH, SG, STB, LC
VT AOT MRD 1	Vermont Test for Stability of Anti-strip Additive in Asphalt Cement - 96 Hour Method	Oven, Hot Asphalt	SG, GH, LC
VT AOT MRD 6	Vermont Test for Acid Insoluble Residue	Oven, Hydrochloric Acid	SGF, GH, GR, LC
VT AOT MRD 10	Effectiveness of Anti-Strip Additive in Asphalt Cement - Boiling Method	Anti-strip Additives, Hot Water, Open Flame, Hot Asphalt, Oven	SG, GH, LC
VT AOT MRD 13	Quantitative Extraction of Bitumen from Bituminous	Asphalt, Xylene, Oven, Hot Bituminous Concrete	SG, GN, GH, LC

Paving Mixtures

VT AOT MRD 14	Mechanical Analysis of Extracted Aggregate	Oven, Dust, VOC's, Heavy Objects, Noise	GH, Hood, STB, H
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APPENDIX B PAGE B14

BITUMINOUS CONCRETE LAB (FIELD AND CENTRAL) (CONTINUED)

VT AOT MRD 15	Sieve Analysis	Oven, Dust, Heavy Objects, Noise	GH, Hood, STB, H
VT AOT MRD 22	Determination of Thin and/or Elongated Particles in Coarse Aggregate	Dust, Heavy Objects	Vent, STB
VT AOT MRD 23	Determination of Coarse Aggregate Particles with Fractured Faces	Dust, Heavy Objects	Vent, STB
ASTM 4791	Test Method for Elongated and Flat Particles	Dust, Heavy Objects	Vent, STB
ASTM D5821	Determining the Fractured Particles in Coarse Aggregate	Dust, Heavy Objects	Vent, STB

APPENDIX B PAGE B15

CEMENT LAB AND TINIUS ROOM

TESTS

- AASHTO T129 / ASTM C187
- AASHTO T131 / ASTM C191
- AASHTO T-27 / ASTM C-136
- AASHTO T137 / ASTM C185
- AASHTO T153 / ASTM C204
- AASHTO -- / ASTM C778
- AASHTO T154 / ASTM C266
- AASHTO T106 / ASTM C109
- AASHTO T107 / ASTM C151
- AASHTO T162 / ASTM C305
- AASHTO T186

CHEMICALS USED

- Calcium Hydroxide (used to prepare saturated lime solution)
- Crystalline Silica (Ottawa Sand)
- Flake Graphite
- Fly Ash
- Form Coating
- Mercury
- Paraffin Wax
- Phenolphthalein
- Portland Cement, All Types
- 2-Propanol
- Red Reader Glymol
- Silica Fume Cement and Slurry
- Sodium Hydroxide
- WD-40
- Vacuum Grease

APPENDIX B PAGE B16

CEMENT LAB AND TINIUS ROOM

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 22-92	Compressive Strength of Cylindrical Concrete Specimens	Capping Compounds, Heavy Objects, Flying Debris, Noise	SG, GH, GR, STB, LC, H
T 27-93	Sieve Analysis of Fine and Coarse Aggregates	Oven, Dust, Heavy Objects, Noise, Sodium Hydroxide	GH, Hood, STB, H
T 68-96	Tension Testing of Metallic Materials	Heavy Objects, Noise, Flying Metal, Sharp Edges, Band Saw	SG, H, STB, GW, NO
T 80-93	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials	Pinch Point	NO
T 106-92	Compressive Strength of Hydraulic Cement Mortar (Using 2in. 50mm Cube Specimens)	Mixer, Cement Dust, Cement Paste, Splashing, Heavy Objects, Flying Debris	NO,SG, GR, STB, LC
T 107-91 GR	Autoclave Expansion of Portland Cement	Steam, High Pressure, Flake Graphite	GH, SG, LC,
T 127-90	Sampling and Testing of Hydraulic Cement	Cement Dust, Cement Paste, Work Zones	SG, GW, STB
T 129-88	Normal Consistency of Hydraulic Cement	Cement Dust, Cement Paste, Work Zone	SG, GW, STB
T 131-93	Time of Setting of Hydraulic Cement by Vicat Needle	Mixer, Cement Dust, Cement Paste, Splashing	SG, GR, LC, NO
T 137-93	Air Content of Hydraulic Cement Mortar	Mixer, Cement Dust, Cement Paste, Splashing	SG, GR, LC, NO

T 153-93	Fineness of Portland Cement by Air Permeability Apparatus	Cement Dust, Red Reader Glymol	SG, GR, LC
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APPENDIX B PAGE B17

CEMENT LAB AND TINIUS ROOM (CONTINUED)

T 154-91	Time Setting of Hydraulic Cement by Gilmore Needles	Mixer, Cement Dust, Cement Paste, Splashing	SG, GR, LC, NO
T 162- 92	Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency	Mixer, Cement Dust, Splashing, Cement Paste	SG, GR, LC, NO
T 186-97 NO	Early Stiffening of Hydraulic Cement	Mixer, Cement Dust, Splashing, Cement Paste	SG, GR, LC,
T231-90	Capping Cylindrical Concrete Specimens	Hot Pot, Splashing Sulfur, Fumes	GH, GW, SG,LC Hood, Vent
T 244-92	Mechanical Testing of Steel Products	Heavy Objects, Noise, Flying Metal, Sharp Edges, Band Saw	SG, H, STB,GW, NO, SG, GR

APPENDIX B PAGE B18

CONCRETE LAB - STRUCTURAL

TESTS

AASHTO T-2 / ASTM D-75
AASHTO T-19 / ASTM C-29
AASHTO T-21 / ASTM C-40
AASHTO T-22 / ASTM C-39
AASHTO T-23 / ASTM C-31
AASHTO T-24 / ASTM C-42
AASHTO T-27 / ASTM C-136
AASHTO T-68 / ASTM E-8
AASHTO T-80 / ASTM E-18
AASHTO T-84 / ASTM C-128
AASHTO T-85 / ASTM C-127
AASHTO T-96 / ASTM C-131
AASHTO T-97 / ASTM C-78
AASHTO T-106 / ASTM C-109
AASHTO T-107 / ASTM C-151
AASHTO T-119 / ASTM C-143
AASHTO T-121 / ASTM C-138
AASHTO T-126 / ASTM C-192
AASHTO T-127 / ASTM C-183
AASHTO T-129 / ASTM C-187
AASHTO T-131 / ASTM C-191
AASHTO T-137 / ASTM C-185
AASHTO T-141 / ASTM C-172
AASHTO T-152 / ASTM C-231
AASHTO T-153 / ASTM C-204
AASHTO T-154 / ASTM C-266
AASHTO T-155 / ASTM C-156
AASHTO T-161 / ASTM C-666
AASHTO T-177 / ASTM C-293
AASHTO T-196 / ASTM C-173
AASHTO T-197 / ASTM C-403
AASHTO T-231 / ASTM C-617
AASHTO T-244 / ASTM A-370
AASHTO T-248 / ASTM C-702
AASHTO T-255 / ASTM C-566

AASHTO T-277
ASTM C-567
ASTM C-642
ASTM C-805
ASTM C-1064
VT AOT-MRD 22
VT AOT-MRD 23
VT AOT-MRD 40
Rapid Chloride Permeability

APPENDIX B PAGE B19
Concrete Lab – Structural (continued)

CHEMICALS USED

Air Entraining Admixtures
Accelerating Admixtures
Admixtures
Capping Compound
Cement, All Types
Cementitious Repair Material (Grouts & Mortars)
Curing Compounds
Drierite
Epoxies
Fly Ash
Form Coating
High Range Water Reducing Admixtures
Hydrochloric Acid
Methyl Ethyl Ketone
Mercury
Paraffin Wax
Phenolphthalein
Portland Cement, All Types
2 Propanol (Isopropyl
Alcohol)
Ready Mixed Concrete
Retarding Admixtures
Silica Fume
Silicone Lubricant
Sodium Chloride
Sodium Hydroxide
Water Reducing Admixtures
WD-40

APPENDIX B PAGE B20

CONCRETE LAB- STRUCTURAL (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 2-91	Sampling of Aggregates	Quarries, Heavy Objects, Noise	HH, STB, GW, H
T 19-93	Unit Weight and Voids in Aggregate	Oven, Glass Plate, Heavy Objects	GH, GW, STB
T 21-93	Organic Impurities in Fine Aggregates for Concrete	Sodium Hydroxide	SG, LC, GR
T 22-92	Compressive Strength of Cylindrical Concrete Specimens	Heavy Objects, Flying Debris, Noise	STB, SG, H
T 23-93	Making and Curing Concrete Test Specimens in the Field	Construction Area, Splashing Concrete, Noise, Heavy Objects, Traffic	HH, V, STB, SG, H, GW
T 24-93	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	Drill, Saw, Heavy Objects, Flying Debris, Noise, Traffic	HH, V, STB, SG, H
T 27-93	Sieve Analysis of Fine and Coarse Aggregates	Oven, Dust, Heavy Objects, Noise, Sodium Hydroxide	GH, Hood, STB, H
T 68-96	Tension Testing of Metallic Materials	Heavy Objects, Noise, Flying Metal Sharp Edges, Band Saw	SG, H, STB, GW, NO
T 80-93	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials	Pinch Point	
T 84-95	Specific Gravity and Absorption of Fine Aggregate	Oven	GH
T 85-93	Specific Gravity and Absorption of Coarse Aggregate	Oven	GH

T 96-92	Resistance to Abrasion of Coarse Small Size Aggregate by Abrasion & Impact in the Los Angeles Machine	Moving Drum, Noise, Heavy Objects, Oven	STB, H, NO, GH
T 97-86	Flexural Strength of Concrete (Simple Beam with Third Point Loading)	Heavy Objects, Flying Debris	SG, STB

APPENDIX B PAGE B21

CONCRETE LAB- STRUCTURAL (CONTINUED)

T 106-92	Compressive Strength of Hydraulic Cement Mortar	Cement Dust, Heavy Objects, Flying Debris	GR, STB, SG, LC
T 107-91	Autoclave Expansion of Portland Cement	Steam, High Pressure, Flake Graphite	GH, SG, LC, GR
T 119-93	Slump of Hydraulic Cement Concrete	Splashing Concrete, Work Zone, Admixtures, Noise, Heavy Objects, Traffic	STB,SG, HH, V, GW
T 121-94	Weight Per Cubic Foot, Yield, & Air Content (Gravimetric) of Concrete	Splashing Concrete, Work Zone, Heavy Objects, Traffic	SG, HH, V, GW, H, STB
T 126-93	Making and Curing Concrete Test Specimens in the Laboratory	Cement Dust, Splashing Concrete, Admixtures, Noise, Heavy Objects	GW, STB, SG, H
T 127-90	Sampling and Amount of Testing of Hydraulic Cement	Cement Dust, Cement Paste, Work Zone	SG, STB, GW
T 129-88	Normal Consistency of Hydraulic Cement	Cement Dust, Cement Paste, Work Zone	SG, GW, STB
T 131-93	Time of Setting of Hydraulic Cement by Vicat Needle	Cement Dust, Cement Paste, Splashing	HH, V, STB, GW
T 137	Air Content Of Hydraulic Cement Mortar	Miter, Cement Dust, Cement Paste, Splashing	SG GR, LC, NO
T 141-93	Sampling Freshly Mixed Concrete	Splashing Concrete, Work Zone, Admixtures, Heavy Objects, Traffic, Noise	SG, HH, V, STB, GR, GW, H
T 152-93	Air Content of Freshly	Splashing Concrete, Work Zone,	SG HH,V,STB GW, H,

	Mixed Concrete by the Pressure Method	Admixtures, Heavy Objects, Traffic, Noise	GR
T 153-93	Fineness of Portland Cement by Air Permeability Apparatus	Cement Dust, Red Reader Glymol	SG, GR, LC
T 154-91	Time Setting of Hydraulic Cement by Gilmore Needles	Mixer, Cement Dust, Cement Paste, Splashing	SG, GR LC, NO,
T 155-91	Water Retention of Concrete Curing Materials	Splashing Chemicals	SG, STB, GR

APPENDIX B PAGE B22

CONCRETE LAB- STRUCTURAL (CONTINUED)

T 161-93	Resistance of Concrete to Rapid Freezing and Thawing	Heavy Objects, Sodium Chloride	GR, SG, LC, STB
T 177-81	Flexural Strength of Concrete (Simple Beam with Center Point Loading)	Heavy Objects, Flying Debris	STB, SG
T 196-95	Air Content of Freshly Mixed Concrete by the Volumetric Method	Splashing Concrete, Work Zone, Heavy Objects	SG, STB HH, V H,
T 197-93	Time of Setting of Concrete Mixtures by Penetration Resistance	Cement Dust, Splashing Concrete, Heavy Objects	SG, STB GR,
T 231-90	Capping Cylindrical Concrete Specimens	Hot Pot, Splashing Sulfur, Fumes	GH, GW, SG, LC, Hood, Vent
T 244-92	Mechanical Testing of Steel Products	Heavy Objects, Noise, Flying Metal, Sharp Edges, Band Saw	SG, H, STB, GW, NO
T 248-95	Reducing Field Samples of Aggregate to Testing Size	Heavy Objects, Dust	SG, STB
T255-92	Total Moisture Content of Aggregate by Drying	Oven	STB, Hood, Vent, GH
T 277-93	Rapid Chloride Permeability of Concrete	Heavy Objects, Sodium Chloride, Sodium Hydroxide	STB, SG, GN, LC
ASTM C- 567 V, H	Standard Test Method for Unit Weight of Structural Lightweight Concrete	Splashing Concrete, Work Zone, Heavy Objects	SG, STB, HH,

ASTM C- 642 Standard Test Method for Density, Absorption, Voids in Hardened Concrete	Oven, Boiling Water	GH, STB, SG
ASTM C- 805 Standard Test Method for Rebound Number of Hardened Concrete	Rebound Hammer, Work Zone	STB, HH, SG, GR
ASTM C- 1064 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete	Splashing Concrete, Work Zone	STB, HH, SG, GR

APPENDIX B PAGE B23

CONCRETE LAB- STRUCTURAL (CENTRAL AND FIELD) (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
VT AOT MRD 22	Determination of Thin and/or Elongated Particles in Coarse Aggregate		
VT AOT MRD 23	Determination of Coarse Aggregate Particles with Fractured Faces	Dust, Heavy Objects	STB
VT AOT MRD 40-86	Vermont Standard Procedure for Determination of PCC Pavement Thickness for Final Acceptance and Payment	Work Zone, Coring Machine, Heavy Objects, Noise	STB, V, H, HH,SG, GW

APPENDIX B PAGE B24

DRILLERS

TEST

- AASHTO 203
- AASHTO 206
- AASHTO 207
- AASHTO 223
- AASHTO 225
- AASHTO 251
- AASHTO 254

CHEMICALS USED

Anti-freeze
Brake Cleaner
Diesel Fuel Additive
Drilling Fluids - Baroid Quik-Gel
Electric Detonators - Dyno Nobel
Explosives - Kinepak
Fire Extinguisher - ABC
Grease - Durashield 80
Grease - Threadtex
Hydraulic Oil
Kerosene & Diesel #1
Marking Paints - All Colors
Portland Cement
Propane
Silica, Crystalline Quartz
Solid Marker - Markal Paintstik
Sparkleen
Tar Solvent

Unleaded Gasoline
 Waterless Handcleaner - Mac s
 Windshield Washer
 Zn-Grease

APPENDIX B PAGE B25

DRILLERS(CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 203-82	Soil Investigation and Sampling by Auger Borings	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn-Grease	HH, V, SG, GW, GN, STB, H, TV, GRE
T 206-82	Penetration Test and Split-Barrel Sampling of Soils	Drill Rig, Heavy Objects, Traffic, Noise, Zn-Grease, Contaminated Soil	HH, V SG, GW, H, TV, GN, STB, GRE
T 207-87	Thin Walled Tube Sampling of Soils	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn-Grease	STB, SG, HH, V, GW, GR, H
T 223-76	Field Vane Sheer Test in Cohesive Soil	Drill Rig, Heavy Objects, Traffic, Noise, Zn- Grease	HH, GW, H, V, SG, STB
T 225-83	Diamond Core Drilling for Site Investigation	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn-Grease	SG, GW, HH, V, GN, STB, GRE, H, TV
T 251-77	Soil Investigation and Sampling by Hollow Stem Auger Borings	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn- Grease	GN, STB, GRE, HH, V, SG, GW, H, TV
T 254-80	Installing, Monitoring and Processing Data of the Traveling Type Slope Inclinometer	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn-Grease	HH, V, SG, GW, GN, STB, GRE, H, TV
T 306-98	Auger Borings for Geotechnical Investigations	Drill Rig, Heavy Objects, Contaminated Soil, Traffic, Noise, Zn-Grease	GN, STB, GRE, HH, V, SG, GW,

Soil Investigation by Hand Probe	Metal Chips, Impact	H, TV GW, HH, SG, STB
D 5092-02 Monitoring Well Installation	Drill Rig, Heavy Objects, Traffic, Noise Contaminated Soil & Ground Water	HH, V, STB, SG, GW, H, GN, GRE, GR, TV

APPENDIX B PAGE B26

INDEPENDENT ASSURANCE

TESTS

- AASHTO T2
- AASHTO T11
- AASHTO T23
- AASHTO T27
- AASHTO T30-93
- AASHTO T99/T180
- AASHTO T119
- AASHTO T121
- AASHTO T141
- AASHTO T152
- AASHTO T164-01
- AASHTO T166
- AASHTO T168
- AASHTO T180
- AASHTO T191
- AASHTO T196
- AASHTO T209-99
- AASHTO T217
- AASHTO T-245
- AASHTO T248
- AASHTO T269-97
- AASHTO T308-01
- AASHTO T310-3
- AASHTO T312-03

CHEMICALS USED

- Admixtures (Portland Cement Concrete)
- Anti-strip Additives
- Asphalt Cements, All Grades
- Calcium Carbide
- Crystalline Silica --Ottawa Sand
- Form Coating Oil
- Isopropyl Alcohol
- Mercury
- Portland Cement, All Types
- Radioactive Sources (i.e. Cesium Americium)
- Ready Mixed Concrete
- Silicone Lubricant
- WD-40

APPENDIX B PAGE B27

INDEPENDENT ASSURANCE (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 2-91	Sampling of Aggregates	Quarries, Heavy Objects, Noise	HH, STB, GW, H
T 11-91	Materials Finer than 75um (No.200 Sieve) in Mineral Aggregates by Washing	Oven	
T 23-93	Making and Curing Concrete Test Specimens in the Field	Construction Area, Splashing Concrete, Noise, Heavy Objects, Traffic	HH, V, STB, SG, H, GW
T 27-95	Sieve Analysis of Fine and Coarse Aggregates	Oven, Dust, Heavy Objects, Noise	GH, Hood, STB, H
T30-93	Mechanical Analysis of Extracted Aggregate	Oven, Dust, Heavy Objects, Noise, Detergent, VOC's, Anti-strip Additives	GH, STB, H, SG, LC, Hood
T 99-95	Moisture-Density Relations of Soil using a 5.5 lb Rammer and 12 in Drop	Oven, Heavy Objects, Dust, Flying Debris	STB, GH SG
T 119-93	Slump of Hydraulic Cement Concrete,	Splashing Concrete, Work Zone, Admixtures, Noise, Heavy Objects, Traffic	SG, HH, V,STB GW
T 121-94	Weight Per Cubic Foot, Yield, & Air Content (Gravimetric) of Concrete	Splashing Concrete, Work Zone, Heavy Objects, Traffic	SG, HH, V, STB, GW, H

T 141-93	Sampling Freshly Mixed Concrete	Splashing Concrete, Work Zone, Admixtures, Heavy Objects, Traffic	SG, HH, V, STB, GR, GW, H
T 152-93	Air Content of Freshly Mixed Concrete by the Pressure Method	Splashing Concrete, Work Zone, Admixtures, Heavy Objects, Traffic, Noise	SG, HH, V, STB, GW, H, GR
T 164-01	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures	Anti-strip Additives, Hot Bituminous Concrete, VOC's, Trichloroethylene, Xylene	SG, GH, GN, Hood, LC, SGF
T 166-93	Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface Dry Specimens	Asphalt, Anti-strip Additives, Oven, Noise	SG, GH, Hood

APPENDIX B PAGE B28

INDEPENDENT ASSURANCE (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 168-96	Sampling Bituminous Paving Mixtures	Hot Asphalt, Anti-strip Additives, Hot Materials, Noise, Work Area	H, HH, GH, SG, STB
T 180-95	The Moisture-Density Relations of Soils using a 10 lb Rammer and an 18 in. Drop	Heavy Objects, Flying Debris, Oven	STB, SG, GH
T 191-93	Density of Soil In-Place by the Sand Cone Method	Oven, Work Zone	GW, HH, V, STB
T 196-95	Air Content of Freshly Mixed Concrete by the Volumetric Method	Splashing Concrete, Work Zone, Heavy Objects	STB, HH, V, SG, H
T209-99	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixture	Hot Asphalt, Anti-strip Additives, Oven	SG, GH, LC
T 217-87	Determination of Moisture in Soils by means of a Calcium Carbide Gas Pressure Moisture Tester	Calcium Carbide, Work Zone	GW, HH, V, STB, SG
T 245-94	Resistance to Plastic Flow	Oven, Asphalt, Anti-strip Additives,	SG, STB, GH, H, LC

	of Bituminous Mixtures using Marshall Apparatus	Heavy Objects, Noise	
T 248-95	Reducing Field Samples of Aggregate to Testing Size	Heavy Objects, Dust, Mercury Thermometers	STB, Hood, SG, GR, Ventilation
T 269-97	Percent Air Voids in Compacted Dense and open Bituminous Paving mixture	Anti-strip Additives	SG
T 308-01	Asphalt Binder Content of Hot Mix Asphalt by the Ignition Method	Hot Asphalt, Dust, Heavy Objects, VOC'S, Oven	GH, SG
T 310-03	In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Method	Radiation, Heavy Objects, Work Zone, Anti-strip Additives	STB, HH, V

APPENDIX B PAGE B29

INDEPENDENT ASSURANCE (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 312-03	Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of the Superpave Gyrotory Compactor	Hot Asphalt, Heavy Objects, Anti-strip Additives, Compactor	SG, GH, NO, STB

RESEARCH & DEVELOPMENT UNIT AND FIELD TESTING

- | | |
|----------------|-----------------|
| - VAOT-MRD 35 | - VAOT-MRD 42 |
| - VAOT-MRD 37 | - VAOT-MRD 46 |
| - VAOT-MRD 41 | - ASTM E1710-97 |
| - ASTM D913-03 | |

CHEMICALS USED

- Copper Sulfate crystals (used in bridge deck meter for testing corrosion activity)
- Copper Sulfate Anti-Freeze Solution

MATERIALS USED

- Crystalline Silica (Ottawa Sand)
- Highway Marking Paint
- Pavement Markings (Paint, Epoxy, Tape, Thermoplastic)
- Polyurethane Sealer
- Sheet Waterproofing Membrane

APPENDIX B PAGE B30

RESEARCH & DEVELOPMENT UNIT AND FIELD TESTING (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
ASTM E1710-97	Test Method for Measurement of Retroreflective Pavement Markings with CEN Prescribed Geometry Using a Portable Retroreflectometer.	Traffic, Noise	GW, HH, STB, V
ASTM D913-03	Test Method for Evaluating Degree of resistance to Wear of Waterborne Paint.	Traffic, Noise	GW, HH, STB, V
VT AOT MRD 35	Vermont Test for Obtaining Samples of Pulverized Core Drill Concrete for Chloride Analysis	Traffic, Noise	GW, STB, SG, H, HH, V,
VT AOT MRD 37	Method of Test for Locating and Measuring Delaminations in Concrete Bridge Decks	Traffic	V, HH, STB, SG
VT AOT MRD 41-88	Method of Test for Determining Corrosion Activity in Reinforced Concrete	Core Drill, Copper Sulfate, Traffic	SG, GR, H, HH, V, STB

VT AOT MRD 42-88	Method of test for Determining Corrosion Activity on Membrane Waterproofed Bridge Decks	Core Drill, Copper Sulfate, Traffic	SG, GR, H, HH, V, STB
VT AOT MRD 46	Vermont Test Procedure for Inspection of Durable Pavement Markings	Hot Pavement Markings, Traffic	GW, HH, V, STB

APPENDIX B PAGE B31

SOILS LAB

TESTS

- AASHTO T87
- AASHTO T88
- AASHTO T89
- AASHTO T90
- AASHTO T99
- AASHTO T100 / ASTM D854
- AASHTO T180
- AASHTO T193
- AASHTO T208 / ASTM D2166
- AASHTO T216 / ASTM D2435
- AASHTO T265 / ASTM D 2216
- AASHTO T267
- AASHTO T296
- AASHTO T297
- ASTM D1140

CHEMICALS USED

- Mercury
- Sodium Hexametaphosphate

- WD-40
- Zinc Grease

APPENDIX B PAGE B32

SOILS LAB (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
T 87-00	Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test	Oven, Dust	GH, Hood
T 88-00	Particle Size Analysis of Soils	Dispersing Agents, Buffers, Splashing	SG, GR, LC, GH
T 89-02	Determining the Liquid Limit of Soils	Oven	GH
T 90-00	Determining the Plastic Limit and Plasticity Index of Soils	Oven	GH
T 99-01	The Moisture-Density Relations of Soils using a 5.5 lb Rammer and a 12 in. Drop	Heavy Objects, Flying Debris, Oven	STB, SG, H,H
T 100-03	Specific Gravity of Soils	Oven	GH
T 180-01	The Moisture-Density Relations Soils using a 10 lb Rammer	Heavy Objects, Flying Debris, Oven	STB, SG, GH, H of

and an 18 in. Drop

T 193-03	The California Bearing Ratio	Heavy Objects, Flying Debris, Oven	STB, SG, GH
T 208-00	Unconfined Compressive Strength of Cohesive Soil	Heavy Objects	STB
T 216-03	One-Dimensional Consolidation Properties of Soils	Heavy Objects	STB
T 265-00	Laboratory Determination of Moisture Content of Soils	Oven	GH
T 267-00	Organic Content in Soils by Loss on Ignition	Oven	GH, SG, H

APPENDIX B PAGE B33

SOILS LAB (CONTINUED)

<u>TEST</u>	<u>NAME</u>	<u>HAZARD</u>	<u>PPE CODE</u>
		Triaxial Compression	
T 297-00	Consolidated Undrained Triaxial Compression Test on Cohesive Soils	Oven, compression	GH
D1140-00	Amount of Material in Soils Finer than #200 Sieve	Oven	GH

APPENDIX C PAGE C1

Basic Rules and Procedures for Working with Chemicals, 1910.1450 (E) (1).

(a) Accidents and spills:

Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.

Ingestion: Contact Vermont Poison Control Center, Burlington 1-802-658-3456. Encourage the victim to ingest large amounts of water.

Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

and Clean-up: Promptly clean up spills, using appropriate protective apparel equipment and proper disposal.

(b) Avoidance of routine exposure: Develop and encourage safe habits. Avoid unnecessary exposure to chemicals by any route. Do not smell or taste chemicals. Vent apparatus which may discharge toxic chemicals into local exhaust devices. Inspect gloves before use.

(c) Choice of chemicals: Use only those chemicals for which the quality of the available ventilation system is appropriate.

- (d) Eating, smoking, etc.: Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present. After using lab chemicals, wash hands before conducting these activities. Avoid usage of refrigerators, ovens or utensils for food or beverages if they are also used for laboratory operations.
- (e) Equipment and glassware: Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware. Use equipment only for its designed purpose.
- (f) Exiting: Wash areas of exposed skin well before leaving the laboratory.
- (g) Horseplay: Avoid practical jokes or other behavior which might confuse, startle or distract another worker.
- (h) Mouth suction: Do not use mouth suction for pipetting or starting a siphon.

APPENDIX C PAGE C2

- (i) Personal apparel: Confine long hair and loose clothing. Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or cloth sneakers.
- (j) Personal housekeeping: Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored. Clean up the work area on completion of an operation or at the end of a day.
- (k) Personal protection: Assure that appropriate eye protection is worn by all persons, including visitors, where chemicals are stored or handled. Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use, wash them before removal if necessary, and replace them periodically. Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls, inspecting the respirator before use. Use any other protective and emergency apparel and equipment as appropriate. Avoid use of contact lenses in the laboratory unless necessary. If they are used, inform supervisor so special precautions can be taken. Remove laboratory coats immediately upon significant contamination.
- (l) Planning: Seek information and advice about hazards, plan appropriate protective

procedures, and plan positioning of equipment before beginning any new operation.

- (m) Unattended operations: Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service to an unattended operation.
- (n) How to use a hood: Use the hood for operations which might result in release of toxic chemical vapors or dust. As a rule of thumb, use a hood or other local ventilation when working with any appreciably volatile substance with a threshold limit value (TLV) of less than 50 ppm. Confirm adequate hood performance before use. Keep hood closed at all times except when adjustments within the hood are being made. Keep materials stored in hoods to a minimum and do not allow them to block vents or air flow. Leave the hood On when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is off.

APPENDIX C PAGE C3

Basic Rules and Procedures for Working with Chemicals, 1910.1450 (E) (1) (continued)

- (o) Vigilance: Be alert to unsafe conditions and see that they are corrected when detected.
- (p) Waste disposal: Assure that the plan for each laboratory operation includes plans and training for waste disposal. Deposit chemical waste in appropriately labeled receptacles. Do not discharge to the sewer concentrated acids or bases, highly toxic, malodorous, or lachrymatory substances, or any substance which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow.
- (q) Working alone: Avoid working alone in a building. Do not work alone in a laboratory if the procedures being conducted are hazardous.

APPENDIX D PAGE D1

Inspection / Maintenance Forms

Equipment	Date Inspected	Inspected by	Deficiencies	Corrective Action Taken
<u>1. Hoods</u>				
<u>2. Eye Wash</u>				
<u>3. Soak Hose</u>				
<u>4. Safety Cans</u>				

5. Fire Extinguishers

6. First Aid Kit

7. Mercury Spill Kit

8. Lab Area Clean

9. Exit Lights

10. Lab Area Free of
Trip Fall Hazards

11. Other

APPENDIX E PAGE E1

Explanation of MATERIAL SAFETY DATA SHEETS (MSDS)

Material safety data sheets are comprised of written or printed material concerning a hazardous chemical. These MSDS's are prepared in accordance with paragraph (9) of Section 1910.1200 of hazard communications of VOSHA - Safety and Health Standards of General Industry.

The master MSDS listing is kept in a yellow three ring binder, labeled "MATERIAL SAFETY DATA SHEETS", in the Administrative Unit (Main Office) of the M&R Section. In addition, MSDS files for each specific laboratory are prominently displayed in that particular laboratory. All new chemicals coming into the M&R Section must be accompanied by an MSDS. The master file and the individual file in the laboratory receiving the new chemical will be updated with a new MSDS.

