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## CH2M HILL HEALTH AND SAFETY PLAN

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This plan will be kept onsite during field activities and will be reviewed and updated as necessary. This plan adopts, by reference, applicable federal, state, and local health and safety regulations, the standards of practice (SOP) contained in the CH2M HILL *Waste Management and Industrial Processes Discipline Health and Safety Manual, Volumes 1 and 2*, and other applicable CH2M HILL SOPs as appropriate. The Site Safety Coordinator (SSC) is to be familiar with these SOPs. In addition, this plan adopts procedures contained in the work plan for the project.

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### 1.0 PROJECT INFORMATION AND DESCRIPTION

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**CLIENT OR OWNER:** U.S. EPA, Region V

**PROJECT NO:** ORO65619.PP.QS

**PROJECT MANAGER:** Jesse Tremaine

**OFFICE:** Oak Ridge, TN

**SITE NAME:** West Chicago Sewage Treatment Plant (STP)

**SITE ADDRESS:** West Chicago, DuPage County, IL.

**DATE HEALTH AND SAFETY PLAN PREPARED:** August 1992

**DATE(S) OF INITIAL VISIT:** December 1992

**DATE(S) OF SITE WORK:** December 1992 - August 1993

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**SITE ACCESS:** The site is accessed by vehicle using highway 59, on the southwest corner of West Chicago, IL.

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**SITE SIZE:** Approximately 25 acres are occupied by the STP. The east central and northeast portions are the area of investigation for this task.

**SITE TOPOGRAPHY:** This portion of DuPage County is characterized by gently rolling topography, with greater relief near rivers and creeks. The West Branch of the DuPage River borders the eastern side of the STP.

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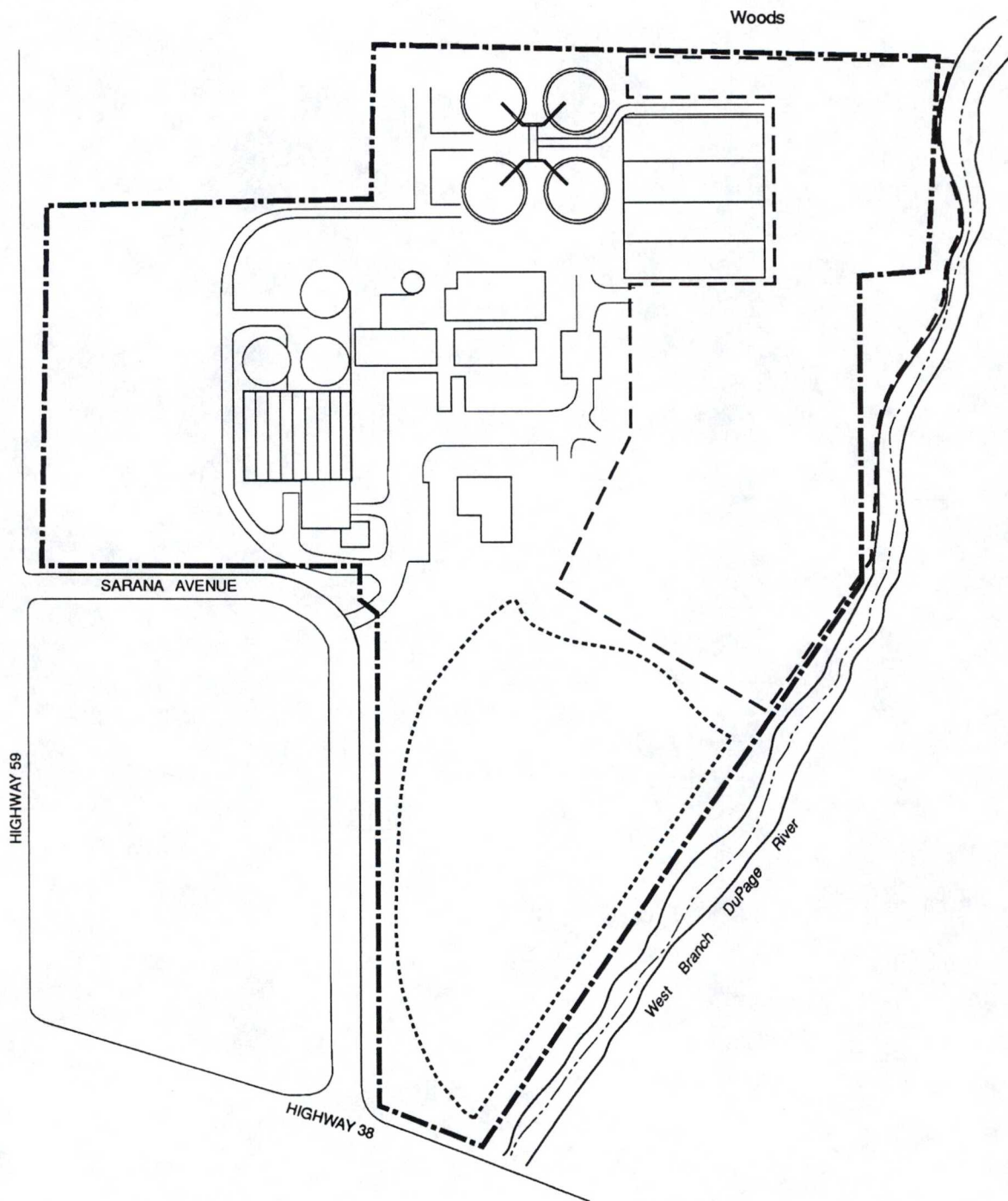
**SITE DESCRIPTION AND HISTORY:** Visual inspection of the present STP site and a series of aerial photos dating back to 1939 indicate the periodic presence of landfill activities at the site. The STP was in existence in 1939 and included eight sludge disposal ponds located near the river. In 1939, there was no visible indication of dumping or landfilling of wastes.

The next available aerial photograph, taken in 1954, indicates material had been deposited on the bank of the river adjoining the STP. Material had also been placed over four of the sludge disposal ponds that were present in 1939. The two deposits appear to overlap in some areas. The other four sludge disposal ponds were no longer in use in 1954.

By 1961, there had been an addition to the STP. There was renewed solid waste disposal to the west of the plant, and the operating plant had been enclosed in a fence. By October 1967, a large settling pond that covered the southern triangular area of the site was added. There were five smaller ponds east of the plant, between the actual plant facilities and the river. These ponds appear to be in the area of the four former sludge disposal ponds that were not covered over with solid material. A 1974 photograph indicates one of the smaller ponds has been drained and that there may be several areas of the solid waste disposal in the northeast section of the site.

Radioactive ore, tailings and process waste from the Kerr-McGee Rare Earths Facility (REF) were used at some unknown time in the past to fill a decommissioned sludge holding tank, to contour the grounds, and as a mix with landfill wastes. These wastes appear to have been placed in the eastern half of the northern rectangular area of the site. In addition to filling in areas on the STP, the material was used as fill for about 320 ft along the bank of the river. Contaminated material may have eroded into the river.

In the late 1980's, the city expanded the treatment plant. Radioactive wastes within the construction area were temporarily stored in an old lagoon in the eastern part of the site. Thorium materials from the STP were removed from the lagoon in 1987 and returned to Kerr-McGee REF.



Approximate Scale in Feet  
0 100 200

#### LEGEND

- STP Property Boundary
- - - Approximate Boundary of Thorium Disposal Activities
- ..... Approximate Filled-in Sludge Lagoon Boundary

#### Site Map

West Chicago STP RI/FS Work Plan

## **2.0 PROJECT ORGANIZATION AND TASKS TO BE PERFORMED UNDER THIS PLAN**

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### **2.1 PROJECT ORGANIZATION**

|                                          |                |
|------------------------------------------|----------------|
| Site Manager                             | Jesse Tremaine |
| Review Team Leader                       | Bruce Haas     |
| Field Activities Manager                 | Greg Schaefer  |
| Data Evaluation and<br>RI Report Manager | Jesse Tremaine |
| FS Report Manager                        | Julie Pfeffer  |

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### **2.2 DESCRIPTION OF TASKS**

Subtask FI.FI. Well Installation and Groundwater Sampling

Subtask FI.FM. Mapping and Surveying

Subtask FI.FR. Radiation Walkover Survey

Subtask FI.FS. Soil Sampling

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### **2.3 DESCRIPTION OF SUBCONTRACTORS**

Drilling will be performed by a subcontractor.

Radiational Walkover Survey will be performed by a subcontractor.

### 3.0 HAZARD EVALUATION AND CONTROL

#### 3.1 HEAT AND COLD STRESS (REFERENCE CH2M HILL SOP IIS-09)

##### 3.1.1 GUIDELINES FOR WORKING IN TEMPERATURE EXTREMES WHILE WEARING PERSONAL PROTECTIVE EQUIPMENT (PPE)

| Temperature                   | Work Cycle | Rest Cycle | Control Measures                                                                                                                                                                                                                                                           |
|-------------------------------|------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <32° F or<br><55° F & raining | 2 hrs      | 15 min     | Review cold stress in safety meeting. Rest in a warm area. Drink at least 8 ounces of warm non-caffeinated, non-alcoholic beverage at each rest break. Schedule a mid-day lunch break of at least 30 minutes in a warm area to begin not later than 5 hours after startup. |
| 72° to 77° F                  | 2 hrs      | 5 min      | Review heat stress in safety meeting. Take resting pulse rate before beginning work. Drink 8 ounces of cool water before beginning work, and 4 ounces at rest break. Have ice available.                                                                                   |
| 77° to 82° F                  | 2 hrs      | 5 min      | As above, but seated rest break. Monitor pulse rate. (See below.)                                                                                                                                                                                                          |
| 82° to 87° F                  | 60 min     | 15 min     | As above, but rest area to be shaded.                                                                                                                                                                                                                                      |
| 87° to 90° F                  | 30 min     | 15 min     | As above. Try to provide a shaded work area.                                                                                                                                                                                                                               |
| >90° F                        | 15 min     | 15 min     | As above. Provide a shaded area with seats in the work area for team members to use as needed. Try to reschedule work to avoid mid-day heat.                                                                                                                               |

**PULSE CRITERIA.** Take resting radial (wrist) pulse at start of work day; record it. Measure radial pulse for 30 seconds as rest period begins. Pulse not to exceed 110 beats per minute (bpm), or 20 bpm above resting pulse. If pulse exceeds this criteria, reduce work load and/or shorten the work cycle by one third, and observe for signs of heat stress. No team member is to return to work until his/her pulse has returned to <110 bpm, or resting pulse +20 bpm.

##### 3.1.2 SYMPTOMS AND TREATMENT OF HEAT AND COLD STRESS

| Heat Stroke                                                                                  | Heat Exhaustion                                                                                                                       | Frostbite                                                                                                                                                                                                        | Hypothermia                                                                                                 |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high body temperature.  | Pale, clammy, moist skin; profuse sweating; weakness; normal temperature; headache; dizzy; vomiting.                                  | Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.                                                                                                                                          | Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.  |
| Cool victim rapidly by soaking in cool (not cold) water. Get medical attention immediately!! | Remove victim to a cool, air conditioned place. Loosen clothing, place in head low position. Have victim drink cool (not cold) water. | Remove victim to a warm place. Rewarm area quickly in warm (not hot) water. Have victim drink warm fluids--not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention. | Remove victim to a warm place. Have victim drink warm fluids--not coffee or alcohol. Get medical attention. |

### 3.2 PHYSICAL (SAFETY) HAZARDS AND CONTROLS (REFERENCE CH2M HILL SOP HS-03)

| Hazard                                           | Engineering or Administrative Controls                                                                                                                                                                                                               |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flying debris/objects                            | Provide shielding and PPE.                                                                                                                                                                                                                           |
| Noise > 85 dBA                                   | Noise protection and monitoring required.                                                                                                                                                                                                            |
| Steep terrain/unstable surface                   | Brace and shore equipment.                                                                                                                                                                                                                           |
| Build-up of explosive gases                      | Provide 20 lb A,B,C fire extinguisher and ventilation.                                                                                                                                                                                               |
| Build-up of static electricity                   | No spark sources within 50 feet of an excavation, heavy equipment, or UST removal. Ground as appropriate.                                                                                                                                            |
| Gas cylinders                                    | Make certain gas cylinders are properly anchored and chained. Keep cylinders away from ignition sources.                                                                                                                                             |
| High pressure hose rupture                       | Check to see that fitting and pressurized lines are in good repair before using.                                                                                                                                                                     |
| Electrical shock                                 | Make certain third wire is properly grounded. Do not tamper with electrical wiring unless qualified to do so.                                                                                                                                        |
| Suspended loads                                  | Work not permitted under suspended loads.                                                                                                                                                                                                            |
| Moving vehicles                                  | Back-up alarm required for heavy equipment. Observer remains in contact with operator and signals safe back-up. Personnel to remain outside of turning radius.                                                                                       |
| Overhead electrical wires                        | Heavy equipment (e.g. drill rig) to remain at least 15 feet from overhead powerline for powerlines of 50 kV or less. For each Kv > 50 increase distance 1/2 foot.                                                                                    |
| Buried utilities, drums, tanks, and so forth.    | Locate buried utilities, drums, tanks, etc. prior to digging or drilling and mark location.                                                                                                                                                          |
| Slip, trip, fall hazards due to muddy work areas | Use wood pallets or similar devices in muddy work areas.                                                                                                                                                                                             |
| Back injury                                      | Use proper lifting techniques, or provide mechanical lifting aids.                                                                                                                                                                                   |
| Confined space entry                             | Permit and safety plan required (reference CH2M HILL SOP HS-17).                                                                                                                                                                                     |
| Trenches/excavations                             | Make certain trench meets OSHA standard before entering. All excavations > 5 feet deep must be sloped or shored. Excavations > 4 feet deep must have a ladder every 25 feet. If not entering trench, remain 2 feet from edge of trench at all times. |
| Protruding objects                               | Flag visible objects.                                                                                                                                                                                                                                |

### 3.3 PROCEDURES TO LOCATE BURIED UTILITIES

Contact local utility to confirm location of buried utilities before and intrusive operations.

### 3.4 BIOLOGICAL HAZARDS AND CONTROLS

| Hazards          | Location and Control Measures |
|------------------|-------------------------------|
| None Anticipated |                               |

### 3.5 TICK BITES, LYME DISEASE, AND ROCKY MOUNTAIN SPOTTED FEVER (RMSF)

Check often for tick bites. If bitten, carefully remove tick with tweezers, making certain to remove pincers, being careful not to crush the tick. After removing the tick, wash your hands. Disinfect area, and dress. If the tick resists or cannot be completely removed, seek medical attention.

Look for symptoms of lyme disease or RMSF. Lyme: rash that looks like a "bull's-eye", with small welt in center, several days to weeks after tick bite. RMSF: Rash comprising red spots under skin, 3 to 10 days after tick bite. For both, chills, fever, headache, fatigue, stiff neck, bone pain. If symptoms appear, seek medical attention.

### 3.6 HAZARDS POSED BY CHEMICALS BROUGHT ONSITE

Refer to CH2M HILL *Hazard Communication Program Manual* which is available from the Corporate Human Resources Department in Denver. The Project Manager is to request Material Safety Data Sheets (MSDSs) from the client, or contractors and subcontractors for chemicals that CH2M HILL employees are potentially exposed to.

| Chemical                                  | Location                    |
|-------------------------------------------|-----------------------------|
| Isobutylene 100 ppm (HNu) calibration gas | Instrument Calibration Area |

### 3.7 RADIOLOGICAL HAZARDS AND CONTROLS

Refer to the CH2M HILL *Waste Management and Industrial Processes Discipline Health and Safety Manual, Volume 2* for standards of practice for operating in contaminated areas.

| Hazards                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Controls                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The nature and extent of radiological contamination has been investigated using radiological walkover surveys, subsurface radiological surveys, soil sampling, groundwater sampling, soil borings, and air sampling.</p> <p>Several areas of radiological contamination have been excavated and are not of radiological concern. The northeast corner of the facility and near the wastewater outfalls may contain residual amounts of radiological contamination.</p> | <p>TLD badges will be worn by all employees entering the facility. Radiation survey instruments will be available on site for frisking personnel leaving the work zones and for scanning equipment. See Attachment 4 for radiological procedures.</p> |
| <p>The potential exists during excavation for airborne contamination. Internal deposition may also occur due to improper doffing of PPE, handling contaminated equipment, accidental ingestion or injection. Absorption is not considered to be a significant internal exposure pathway.</p>                                                                                                                                                                              | <p>An In Vitro Bioassay Program will be implemented to monitor internal exposures. Each employee has completed at least the minimum required training for work at hazardous waste sites. The bioassay program is described in Attachment 4.</p>       |

| 3.8 KNOWN CONTAMINANTS OF CONCERN                                                                                                                                                                                                                                                                                                                                |                                                                                     |                        |                          |                                                                                                                                                                                                                       |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Contaminant                                                                                                                                                                                                                                                                                                                                                      | Location and Highest Concentration<br>(solid media: ug/kg or<br>liquid media: ug/l) | PEL, or TLV<br>(ppm)   | IDLH<br>(ppm)            | Symptoms and Effects of Exposure                                                                                                                                                                                      | PIP |
| Thorium-232                                                                                                                                                                                                                                                                                                                                                      | N/L                                                                                 | 2,000 uR/hr            | N/A                      | No visible symptoms at this level                                                                                                                                                                                     | N/A |
| Lead                                                                                                                                                                                                                                                                                                                                                             | N/L (S)                                                                             | 0.05 mg/m <sup>3</sup> | 700<br>mg/m <sup>3</sup> | Weak, lass, insom, facial pallor, pal eye,<br>anor, low-wgt, malnut, constip, abdom pain,<br>colic, anemia, gingival lead line, tremor, para<br>wrist-ankles, encephalopathy, nephropathy, irrit<br>eyes, hypotension | N/A |
| Uranium-238                                                                                                                                                                                                                                                                                                                                                      | N/L                                                                                 | 0.05 mg/m <sup>3</sup> | 30<br>mg/m <sup>3</sup>  | Derm, in animals- lung, lymph node damage,                                                                                                                                                                            | N/A |
|                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |                        |                          |                                                                                                                                                                                                                       |     |
|                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |                        |                          |                                                                                                                                                                                                                       |     |
| <p>Note 1: Lower value of PEL, or TLV listed.</p> <p>Note 2: NL = no limit found in reference materials.</p> <p>Note 3: PIP = photoionization potential</p> <p>Note 4: Location refers to physical location. Abbreviations specify media:<br/>A (AIR) D (DRUMS) F (FLYASH) GW (GROUNDWATER) L (LAGOON) TK (TANK)<br/>S (SOIL) SL (SLUDGE) SW (SURFACE WATER)</p> |                                                                                     |                        |                          |                                                                                                                                                                                                                       |     |

| 3.9 POTENTIAL ROUTES OF EXPOSURE                                        |                                                                                                                                                    |        |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| DERMAL: Minimize exposures through the use of skin and hand protection. | INHALATION: Minimize radiation and organic vapor exposure through the use of respiratory protection inside fenced area or at designated hot spots. | OTHER: |

#### 4.0 PERSONNEL

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#### 4.1 CH2M HILL EMPLOYEES (REFERENCE CH2M HILL SOP HS-01 AND HS-02)

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Employees listed below are enrolled in the CH2M HILL chemical protection program (CPP) and meet all minimum requirements of medical surveillance, General Radiation Training, 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training requirements of OSHA 29CFR1910.120. Employees designated "SSC" have received 8 hours of supervisor and 8 hours of instrument training and can serve as site safety coordinator (SSC) for the level of protection indicated. There must be one SSC present during any task performed in exclusion or decontamination zones with the potential for exposure to safety and health hazards. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. There must be one FA-CPR designated employee present during any task performed in exclusion or decontamination zones with the potential for exposure to safety and health hazards. The "buddy system" requirements of OSHA 29CFR1910.120 are to be met at all times.

| Employee Name | Office | Responsibility          | SSC/FA-CPR            |
|---------------|--------|-------------------------|-----------------------|
| Greg Schaefer | ORO    | Field Team Leader       |                       |
| TBD           |        | Site Safety Coordinator | Level ( ) SSC; FA-CPR |
| TBD           |        |                         |                       |
|               |        |                         |                       |
|               |        |                         |                       |
|               |        |                         |                       |
|               |        |                         |                       |
|               |        |                         |                       |

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#### 4.2 HEALTH AND SAFETY AND FIELD TEAM CHAIN OF COMMAND AND PROCEDURES

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##### 4.2.1 CLIENT

Gary Schafer, U.S. Environmental Protection Agency

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##### 4.2.2 CH2M HILL

Field Team Leader - Greg Schaefer

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##### 4.2.3 SUBCONTRACTOR

| 5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) SPECIFICATION <sup>1</sup> (REFERENCE CH2M HILL SOP IIS-07 and IIS-08) |       |                          |                                                |                   |                                        |                                                    |                                                                          |
|----------------------------------------------------------------------------------------------------------------|-------|--------------------------|------------------------------------------------|-------------------|----------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------|
| Task                                                                                                           | Level | Body                     | Foot                                           | Head <sup>2</sup> | Eye                                    | Hand                                               | Respirator                                                               |
| All Tasks                                                                                                      | D     | Work clothing            | Steel-toed shoes or steel-toed boots           | Hardhat           | Safety glasses or approved face shield | As required:<br>Outer - Nitrile                    | None required.                                                           |
| Well installation, intrusive sampling activities                                                               | C     | Tyvek over work clothing | Steel-toes boots or steel-toed shoes w/ covers | Hardhat           | Provided by respirator                 | Outer - nitrile<br>Inner - vinyl, latex or nitrile | APR, full face, MSA Ultratwin or equivalent, cartridges: HEPA (H) filter |
| NOT APPROVED FOR LISTED ACTIVITIES                                                                             | B     |                          |                                                | Hardhat           |                                        |                                                    | Positive pressure demand SCBA: MSA Ultralite or equivalent               |
| Note 1: Modifications:<br>Note 2: The SSC shall specify hardhat areas.                                         |       |                          |                                                |                   |                                        |                                                    |                                                                          |

| 5.1 REASONS TO UPGRADE OR DOWNGRADE LEVEL OF PROTECTION                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Upgrade                                                                                                                                                                                                                                                                                                                                                                              | Downgrade                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>Request of individual performing task.</li> <li>Change in work task that will increase contact or potential contact with hazardous materials.</li> <li>Occurrence or likely occurrence of gas or vapor emission.</li> <li>Known or suspected presence of dermal hazards.</li> <li>Instrument action levels (Section 6.0) exceeded.</li> </ul> | <ul style="list-style-type: none"> <li>New information indicating that situation is less hazardous than originally thought.</li> <li>Change in site conditions that decreases the hazard.</li> <li>Change in work task that will reduce contact with hazardous materials.</li> </ul> |

# 6.0 MONITORING EQUIPMENT SPECIFICATION (REFERENCE CH2M HILL SOP IIS-06)

| Instrument                                                            | Tasks           | Action Levels                                                                                          |                                                                                                 | Frequency                                                                                                                      | Calibration                                                           |
|-----------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Photoionization Detector (PID): 10.2 Ev Lamp, HNu, OVM, or equivalent | Intrusive Tasks | 0-1.0 ppm <sup>ab</sup><br>> 1.0-5.0 ppm <sup>ab</sup><br>ppm <sup>ab</sup><br>> 5.0 ppm <sup>ab</sup> | Level D<br>Level C<br>Level B<br>Stop work; re-evaluate                                         | Measurements will be taken in the breathing zone at the beginning of operations and on a routine basis (e.g. every 15 minutes) | Daily, per manufactures recommendations                               |
| CGI                                                                   | Intrusive Tasks | 0-10% LEL<br>10-25 % LEL<br>>25% LEL                                                                   | No expl. <sup>1</sup> hazard<br>Pot. <sup>2</sup> expl hazard<br>Expl. hazard; evacuate or vent | Measurements will be taken in the breathing zone at the beginning of operations and on a routine basis (e.g. every 15 minutes) | Daily, per Manufactures recommendations                               |
| Radiation Detection Instruments                                       | ALL Tasks       | See Attachment 4                                                                                       |                                                                                                 | Instruments will have been calibrated within the last six months. Unit will be source checked daily by HP or HP technician     | Daily, source check recorded. Calibration within six months of usage. |

Note 1: expl = explosion      Note 2: pot = potential      Note 3: def = deficient      Note 4: ab = above background  
Note 5: N/A = not applicable

## 6.1 CALIBRATION SPECIFICATION

| Instrument                     | Gas                 | Span          | Reading                  | Method                                                       |
|--------------------------------|---------------------|---------------|--------------------------|--------------------------------------------------------------|
| PID: HNU, 10.2 ev probe        | 100 ppm isobutylene | $9.8 \pm 2.0$ | 55 ppm                   | 1.5 l/m reg<br>T-tubing<br><br>0.25 l/m reg<br>direct tubing |
| CGI: MSA 260, 261, 360, or 361 | 0.75 % pentane      | N/A           | 50% LEL<br>$\pm 5$ % LEL | 1.5 l/m reg<br>direct tubing                                 |

## 6.2 AIR SAMPLING

### Method and Description:

- In areas where there is a potential for radioactive airborne particulates, air sampling will be conducted to ensure that the derived air concentration (DAC) for Th-232 ( $1 \times 10^{-12}$  uCi/m<sup>3</sup>) is not exceeded for any 8-hour shift.
- Filter papers on the samplers will be checked periodically with portable survey instruments so that a release of airborne contamination will be detected in a timely fashion.
- Refer to RMS procedure RP-12 "Sampling for Radioactive Airborne Particulates".
- Refer to Attachment 4 of this HSP

### Personnel:

- To be determined based on the results of contamination surveys and job activities. All personnel will wear TLD badges on-site and will use direct reading dosimeters to measure external beta and gamma exposures when in areas of known radiation activity.

### Areas:

- Areas to be sampled for airborne radioactivities will be based on the results of contamination surveys and job activities. Areas that may exceed 10% of the DAC for Th-232 require a radiation work permit.

**Results to be interpreted by:** Radiation results will be evaluated by the CH2M HILL Radiation Safety Officer, George Stephens/ORO at 615/483-9032 ext. 531, or the HP technician on-site.

Organic vapor results will be evaluated by the SSC with the assistance of the District Health and Safety Manager, Robert Nash/ORO at 615/483-9032 ext. 533.

## 7.0 DECONTAMINATION SPECIFICATION (REFERENCE CH2M HILL SOP HS-13)

| Personnel                                                                                                   | Sample Equipment                                                                                           | Heavy Equipment                                                                                          |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Boot wash/rinse</li></ul>                                           | <ul style="list-style-type: none"><li>• Wash/rinse equipment</li></ul>                                     | <ul style="list-style-type: none"><li>• Power wash</li></ul>                                             |
| <ul style="list-style-type: none"><li>• Glove wash/rinse</li></ul>                                          | <ul style="list-style-type: none"><li>• Solvent rinse equipment</li></ul>                                  | <ul style="list-style-type: none"><li>• Steam clean</li></ul>                                            |
| <ul style="list-style-type: none"><li>• Outer glove removal</li></ul>                                       | <ul style="list-style-type: none"><li>• Survey equipment for residual radiation contamination</li></ul>    | <ul style="list-style-type: none"><li>• Survey equipment for residual radiation contamination</li></ul>  |
| <ul style="list-style-type: none"><li>• Body suit removal</li></ul>                                         | <ul style="list-style-type: none"><li>• Solvent disposal method:<br/>Drum material for analysis.</li></ul> | <ul style="list-style-type: none"><li>• Water disposal method:<br/>Drum material for analysis.</li></ul> |
| <ul style="list-style-type: none"><li>• Respirator removal</li></ul>                                        |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Inner glove removal</li></ul>                                       |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Frisk body for residual radiation</li></ul>                         |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Hand wash/rinse</li></ul>                                           |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Face wash/rinse</li></ul>                                           |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Shower ASAP</li></ul>                                               |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• PPE disposal method:<br/>Drum material for disposal.</li></ul>      |                                                                                                            |                                                                                                          |
| <ul style="list-style-type: none"><li>• Water disposal method:<br/>Drum waste water for analysis.</li></ul> |                                                                                                            |                                                                                                          |

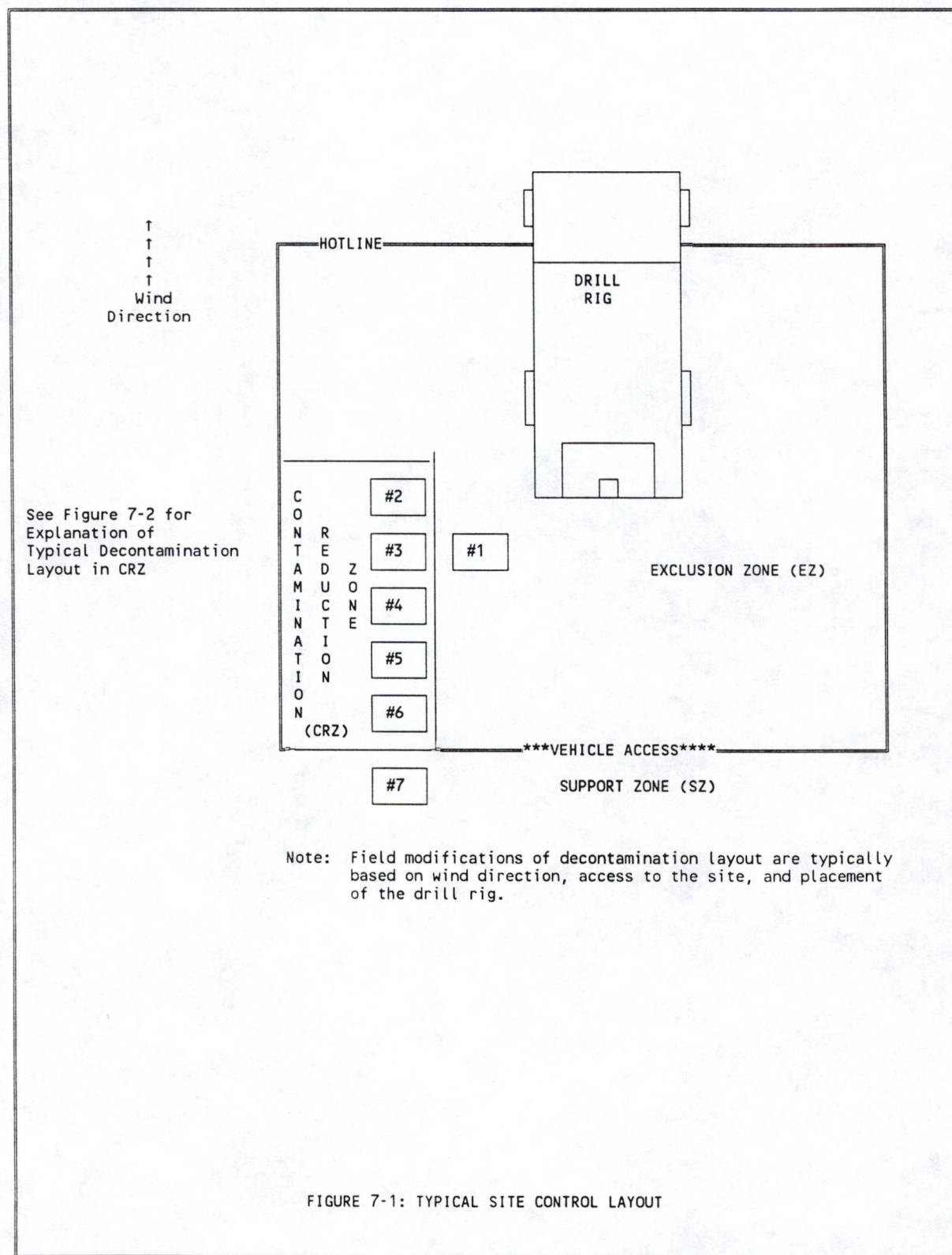
### 7.1 DIAGRAM OF PERSONNEL DECONTAMINATION LINE

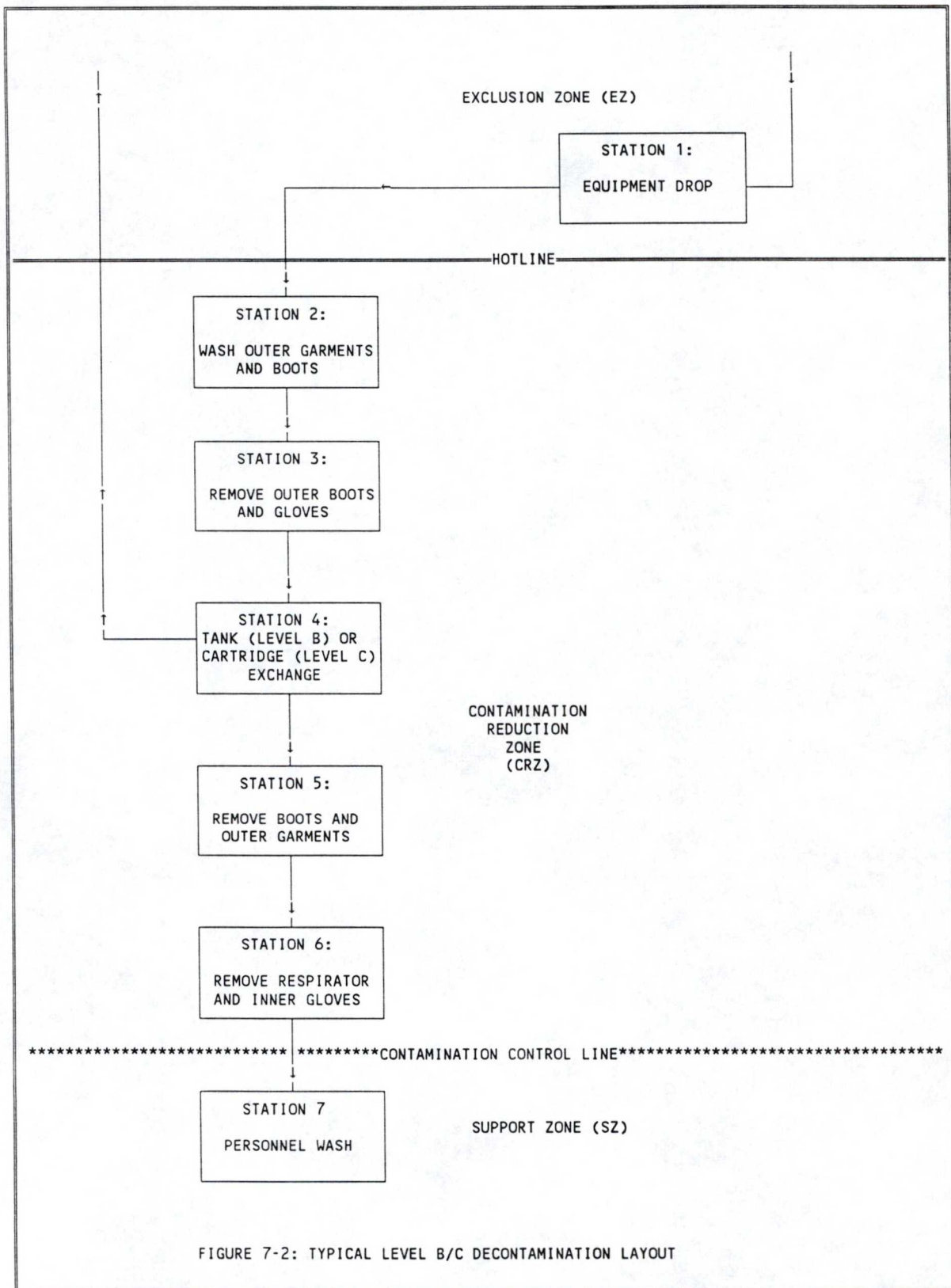
See Typical drawing on next page

## 8.0 SPILL CONTAINMENT PROCEDURES

## 9.0 CONFINED SPACE ENTRY

Confined space entry requires an additional health and safety plan and a permit. Refer to CH2M HILL SOP HS-17, contained in the *Waste Management and Industrial Processes Discipline Health and Safety Manual, Volume 1*.





## 10.0 WORK PROCEDURES

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### 10.1 WORK PRACTICES

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- No spark sources within exclusion or decontamination zones.
  - Avoid visibly contaminated areas.
  - No eating, drinking, or smoking in contaminated areas, or exclusion or decontamination zones.
  - SSC to establish areas for eating, drinking, smoking.
  - No contact lenses in exclusion or decontamination zones.
  - No facial hair that would interfere with respirator fit if Level C or B is anticipated.
  - Site work will be performed during daylight hours whenever possible. Any work conducted during hours of darkness will require enough illumination intensity "to read a newspaper without difficulty."
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### 10.2 SITE CONTROL MEASURES

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- Site safety coordinator (SSC) to conduct site safety briefing (see below) before starting field activities, or as tasks and site conditions change.
- SSC records safety briefing attendance in logbook, and documents topics discussed.
- Post OSHA job site poster in a central and conspicuous location at the site.
- Determine wind direction.
- Establish work zones: support, decontamination, and exclusion zones, and delineate work zones with flagging or cones as appropriate. Support zone upwind of site.
- Establish decontamination procedures, including respirator decontamination procedures, and test.
- Utilize access control at the entry and exit from each work zone.
- Chemicals to be stored in proper containers.
- MSDSs are available for onsite chemicals employees exposed to.
- Establish onsite communications. These should consist of:
  - Line of sight/hand signals
  - Air horn
  - Two-way radio or cellular phone if available
- Establish emergency signals. For example:
  - Grasping throat with hand--EMERGENCY--HELP ME
  - Grasping buddy wrist--LEAVE AREA NOW
  - Thumbs up--OK, UNDERSTOOD
  - Two short blasts on air horn--ALL CLEAR
  - Continuous air horn--EMERGENCY--EVACUATE
- Establish offsite communications.
- Establish "buddy" system.
- Establish procedures for disposal of material generated onsite.
- Initial air monitoring conducted by SSC in appropriate level of protection.
- SSC to conduct periodic inspections of work practices to determine effectiveness of this plan. Deficiencies to be noted, reported to DHSM or RHSM, and corrected.
- Site safety briefing topics: general discussion of health and safety plan; site specific hazards; location of work zones; PPE requirements; equipment; special procedures; emergencies.

## **11.0 EMERGENCY RESPONSE PLAN** (REFERENCE CH2M HILL SOP HS-12)

---

### **11.1 PRE-EMERGENCY PLANNING**

---

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate.

---

- Locate nearest telephone to the site and inspect onsite communications.
  - Locate chemical, safety, radiological, biological hazards.
  - Confirm and post emergency telephone numbers and route to hospital.
  - Post site map marked with location of emergency equipment and supplies.
  - Review emergency response plan for applicability to any changed site conditions, alterations in onsite operations, or personnel availability.
  - Evaluate capabilities of local response teams.
  - Where appropriate and acceptable to the client, inform emergency room/ambulance service and emergency response teams of anticipated types of site emergencies.
  - Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
  - Inventory and check site emergency equipment and supplies.
  - Review emergency procedures for personnel injury, exposures, fires, explosions, chemical and vapor releases with field personnel.
  - Locate onsite emergency equipment and supplies of clean water.
  - Verify local emergency contacts, hospital routes, evacuation routes, and assembly points.
  - Drive route to hospital.
  - Review names of onsite personnel trained in first aid and CPR.
  - Review notification procedures for contacting CH2M HILL's medical consultant and team member's occupational physician.
  - Rehearse the emergency response plan once prior to site activities.
  - Brief new workers on the emergency response plan.
- 

### **11.2 EMERGENCY EQUIPMENT AND SUPPLIES**

---

The SSC marks the locations of emergency equipment on the site map and posts the map in the support zone.

- 10 lb ABC fire extinguisher
- Industrial first aid kit
- Facility emergency equipment:
- Additional emergency equipment:

### 11.3 EMERGENCY MEDICAL TREATMENT

---

- The SSC will assume charge during a medical emergency until the ambulance arrives, or the injured person is admitted to the emergency room.
  - Prevent further injury.
  - Initiate first aid and CPR.
  - Call the ambulance and hospital.
  - Determine if decontamination will make injury worse. Yes--seek medical treatment immediately.
  - Make certain that injured person is accompanied to emergency room.
  - Notify the Project Manager of the injury.
  - Notify the District or Regional Health and Safety Manager.
  - Notify the injured person's human resources department.
  - Prepare an incident report. Submit this to the Corporate Director Health and Safety (WDC) and Corporate Human Resources Department (DEN) within 48 hours.
- 

### 11.4 EVACUATION

---

- Evacuation routes will be designated by SSC prior to beginning of work.
  - Onsite and offsite assembly points will be designated prior to beginning of work.
  - Personnel will exit the exclusion zone and assemble at the onsite assembly point upon hearing the emergency signal for evacuation of the exclusion zone.
  - Personnel will assemble at the offsite point upon hearing the emergency signal for a site evacuation.
  - The SSC and a "buddy" will remain onsite after the site has been evacuated (if possible) to assist local responders and advise them of the nature and location of the incident.
  - SSC accounts for all personnel in the onsite assembly zone.
  - A person designated by the SSC (prior to work) will account for personnel at the offsite assembly area.
  - The SSC is to write up the incident as soon as possible after it occurs, and submit a report to the Corporate Director Health and Safety.
- 

### 11.5 EVACUATION ROUTES AND ASSEMBLY POINTS

---

In case of emergency assemble at the plant entrance on Savanna Avenue.

---

### 11.6 EVACUATION SIGNALS

---

| Exclusion Zone | Site |
|----------------|------|
|                |      |

## 12.0 EMERGENCY RESPONSE TELEPHONE NUMBERS

---

|                      |                                                                       |               |                |
|----------------------|-----------------------------------------------------------------------|---------------|----------------|
| <b>SITE ADDRESS:</b> | Sewage Treatment Plant<br>West Chicago, IL                            | <b>Phone:</b> | None           |
| <b>Police:</b>       | West Chicago Police Department                                        | <b>Phone:</b> | 911            |
| <b>Address:</b>      | 325 Spencer Street<br>West Chicago, IL 60185                          |               | (708) 293-2222 |
| <b>Fire:</b>         | West Chicago Fire Department                                          | <b>Phone:</b> | 911            |
| <b>Address:</b>      | 200 Freemont<br>West Chicago, IL 60185                                |               | (708) 231-2123 |
| <b>Ambulance:</b>    | West Chicago Ambulance                                                | <b>Phone:</b> | 911            |
| <b>Address:</b>      | 200 Freemont<br>West Chicago, IL 60185                                |               |                |
| <b>Water:</b>        | City of West Chicago<br>P. O. 488<br>West Chicago, IL 60186           | <b>Phone:</b> | (708) 293-2210 |
| <b>Gas:</b>          | Northern Illinois Gas<br>1844 West Ferry Road<br>Naperville, IL 60566 | <b>Phone:</b> | (708) 892-8821 |
| <b>Electric:</b>     | Commonwealth Edison<br>125 South Clark Street<br>Chicago, IL 60690    | <b>Phone:</b> | (800) 334-7661 |

---

|                  |                                              |               |                |
|------------------|----------------------------------------------|---------------|----------------|
| <b>Hospital:</b> | Central DuPage Hospital                      | <b>Phone:</b> | (708) 682-1600 |
| <b>Address:</b>  | 25 North Winfield Road<br>Winfield, IL 60190 |               |                |

---

**Route To Hospital: (Refer to map Page 17.)**

---

## 12.1 GOVERNMENT AGENCIES INVOLVED IN PROJECT

---

|                 |                   |               |                |
|-----------------|-------------------|---------------|----------------|
| <b>Federal:</b> | U.S. EPA Region V | <b>Phone:</b> | (312) 353-8827 |
|-----------------|-------------------|---------------|----------------|

---

|               |  |               |  |
|---------------|--|---------------|--|
| <b>State:</b> |  | <b>Phone:</b> |  |
|---------------|--|---------------|--|

---

|               |  |               |  |
|---------------|--|---------------|--|
| <b>Local:</b> |  | <b>Phone:</b> |  |
|---------------|--|---------------|--|

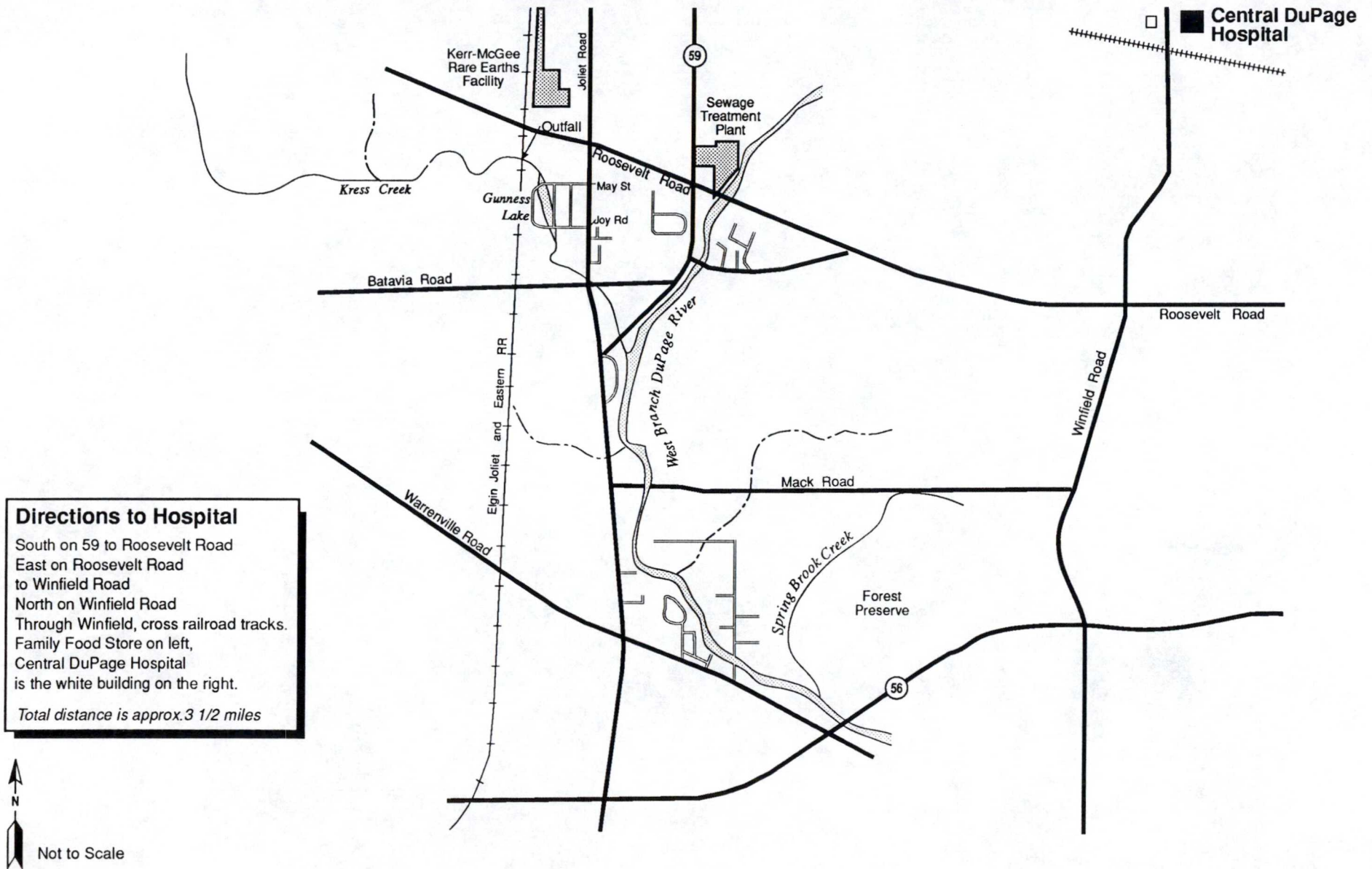


**Figure 12**  
**Route to Hospital**  
 Sewage Treatment Plant Health and Safety Plan

### 13.0 EMERGENCY CONTACTS

|                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CH2M HILL Medical Consultant</b><br><br>Dr. Kenneth Chase<br>Washington Occupational Health Associates<br>202/463-6698 (8 AM to 5 PM EST)<br>202/463-6440 (after hours answering service;<br>physician will return call within 30 minutes) | <b>Occupational Physician (Regional or Local)</b>                                                                                                                                                                                                                                                                       |
| <b>Corporate Director Health and Safety</b><br><br>Name: Marty Mathamel/WDC<br>Phone: 703/471-1441 Ext.4646                                                                                                                                   | <b>Site Safety Coordinator (SSC)</b><br><br>Name:<br>Phone:                                                                                                                                                                                                                                                             |
| <b>District Health and Safety Manager (DHSM)</b><br><br>Name: Robert Nash/ORO<br>Phone: 615/483-9032 Ext.533                                                                                                                                  | <b>Regional Manager</b><br><br>Name: Robert Ogg<br>Phone: 615/483-9032                                                                                                                                                                                                                                                  |
| <b>Regional Health and Safety Manager (RHSM)</b><br><br>Name: N/A<br>Phone:                                                                                                                                                                   | <b>Project Manager</b><br><br>Name: Jesse Tremaine<br>Phone: 615/483-9032                                                                                                                                                                                                                                               |
| <b>Radiation Health Manager (RHM)</b><br><br>Name: George Stephens/ORO<br>Phone: 615/483-9032 Ext. 531                                                                                                                                        | <b>Regional Human Resources Department</b><br><br>Name: Diane Shank<br>Phone: 615/483-9032                                                                                                                                                                                                                              |
| <b>Client</b>                                                                                                                                                                                                                                 | <b>Corporate Human Resources Department</b><br><br>Name: Beth Brown/DEN<br>Phone: 303/771-0952<br><br>If an injury occurs, notify the injured person's<br>personnel office as soon as possible after obtaining<br>medical attention for the injured. Notification<br><u>MUST</u> be made within 24 hours of the injury. |

#### 14.0 PLAN APPROVAL

---

This site safety plan has been written for use by CH2M HILL. CH2M HILL claims no responsibility for its use by others, unless specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these conditions change.

---

PLAN WRITTEN BY: Robert Nash

DATE: 1/25/93

---

PLAN APPROVED BY: Mollie Netherland

DATE: 1/26/93

---

#### 14.1 PLAN AMENDMENTS

---

DATE: CHANGES MADE BY:

---

CHANGES TO PLAN:

---

APPROVED:

DATE:

---

#### 14.2 PLAN AMENDMENTS

---

DATE: CHANGES MADE BY:

---

CHANGES TO PLAN:

---

APPROVED:

DATE:

---

#### 15.0 ATTACHMENTS TO PLAN

---

Attachment 1: Employee signoff

Note: Once approved, a copy of this plan should be forwarded to Marty Mathamel/WDC.

Attachment 2: Form 533

Attachment 3: Applicable MSDSs

Attachment 4: RKP/STP SITE SPECIFIC  
RADIATION PROCEDURES

### EMPLOYEE SIGNOFF

[illegible]

## ATTACHMENT 2

## FORM 533

## RECORD OF HAZARDOUS WASTE FIELD ACTIVITY

SITE NAME:

**SITE SAFETY COORDINATOR:****PROJECT NUMBER:**

**RECORD OF ACTIVITIES FOR (DATES):**

[illegible]

**ATTACHMENT 3**  
**MATERIAL SAFETY DATA SHEETS**

|                                                                                      |                                          |                                                                       |                                                |
|--------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------|
| EMERGENCY PHONE (800) 523-9374<br>IN PENNSYLVANIA (800) 322-9092                     | PRODUCT NAME<br>ISOBUTYLENE              | CAS #115-11-7                                                         | <b>H</b><br>HEALTH                             |
| AIR PRODUCTS AND CHEMICALS, INC.<br>BOX 538<br>ALLENTOWN, PA 18105<br>(215) 481-8257 | TRADE NAME AND SYNONYMS<br>Isobutylene   | CHEMICAL NAME AND SYNONYMS<br>Isobutylene, Isobutene, 2-Methylpropene |                                                |
|                                                                                      | ISSUE DATE<br>AND REVISIONS 04/78, 06/85 |                                                                       | FORMULA<br>(iso) C <sub>4</sub> H <sub>8</sub> |

### HEALTH HAZARD DATA

**TIME WEIGHTED AVERAGE EXPOSURE LIMIT**

See last page.

**SYMPTOMS OF EXPOSURE**

Inhalation: Moderate concentrations which exclude an adequate supply of oxygen to the lungs cause dizziness, drowsiness and eventual unconsciousness. It also has a very mild anesthetic effect which might cause lack of coordination or lessened mental alertness.

Skin and Eye Contact: It is mildly irritating to mucous membranes. Due to its rapid rate of evaporation, isobutylene can cause tissue freezing or frostbite on contact.

**TOXICOLOGICAL PROPERTIES**

Isobutylene has a very mild anesthetic effect, however, the major health hazard is the exclusion of an adequate supply of oxygen to the lungs.

Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering.

**RECOMMENDED FIRST AID TREATMENT**

PROMPT MEDICAL ATTENTION IS REQUIRED IN ALL CASES OF OVEREXPOSURE TO ISOBUTYLENE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND MUST BE AWARE OF EXTREME FIRE AND EXPLOSION HAZARD.

Inhalation: Move exposed personnel to an uncontaminated area. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Medical assistance should be sought immediately.

Skin Contact or Frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has caused blistering of the skin or deep tissue freezing.

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use.

Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

**HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES**

Isobutylene is flammable over a wide range in air.

**PHYSICAL DATA**

|                                                                                                                                    |                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <b>BOILING POINT</b><br>19.6°F ( - 6.9°C)                                                                                          | <b>LIQUID DENSITY AT BOILING POINT</b><br>39.1 lb/ft <sup>3</sup> (626 kg/m <sup>3</sup> ) |
| <b>VAPOR PRESSURE @ 70°F (21.1°C) =</b><br>39 psia (269 kPa)                                                                       | <b>GAS DENSITY AT 70°F, 1 atm</b><br>0.148 lb/ft <sup>3</sup> (2.37 kg/m <sup>3</sup> )    |
| <b>SOLUBILITY IN WATER</b><br>Insoluble                                                                                            | <b>FREEZING POINT</b><br>- 220.6°F ( - 140.3°C)                                            |
| <b>APPEARANCE AND ODOR</b><br>Colorless gas with an unpleasant odor similar to that which is emitted when burning anthracite coal. |                                                                                            |

**FIRE AND EXPLOSION HAZARD DATA**

|                                                                                                                                                                                                                                                                                           |                                                   |                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------|
| <b>FLASH POINT (Method used)</b><br>See last page.                                                                                                                                                                                                                                        | <b>AUTO IGNITION TEMPERATURE</b><br>869°F (465°C) | <b>FLAMMABLE LIMITS % BY VOLUME</b><br>LEL 1.8 UEL 9.6           |
| <b>EXTINGUISHING MEDIA</b><br>Water, carbon dioxide, dry chemical                                                                                                                                                                                                                         |                                                   | <b>ELECTRICAL CLASSIFICATION</b><br>Class 1, Group not specified |
| <b>SPECIAL FIRE FIGHTING PROCEDURES</b><br>Keep cylinder(s) cool with water spray from a distance. If possible without risk, move cylinder(s) away from fire area. If possible without risk, stop the flow of gas to a fire. Allow gas fire to burn itself out. (Continued on last page.) |                                                   |                                                                  |
| <b>UNUSUAL FIRE AND EXPLOSION HAZARDS</b><br>Isobutylene is denser than air and can travel considerable distances to an ignition source and flash back. Cylinder(s) may explode or vent when exposed to fire.                                                                             |                                                   |                                                                  |

**REACTIVITY DATA**

|                                                          |   |                            |
|----------------------------------------------------------|---|----------------------------|
| <b>STABILITY</b><br>Unstable                             |   | <b>CONDITIONS TO AVOID</b> |
| <b>Stable</b>                                            | X |                            |
| <b>INCOMPATIBILITY (Materials to avoid)</b><br>Oxidizers |   |                            |
| <b>HAZARDOUS DECOMPOSITION PRODUCTS</b><br>None          |   |                            |
| <b>HAZARDOUS POLYMERIZATION</b><br>May Occur             |   | <b>CONDITIONS TO AVOID</b> |
| <b>Will Not Occur</b>                                    | X |                            |

**SPILL OR LEAK PROCEDURES****STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, call the "800" emergency phone number listed herein.

**WASTE DISPOSAL METHOD**

All Federal, State and Local regulations regarding health and pollution should be followed in waste disposal. Contact Air Products for specific recommendations. Do not dispose of unused quantities.

(Continued on last page)

## SPECIAL PROTECTION INFORMATION

|                                                                                                                                                                |                                                                 |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------|
| <b>RESPIRATORY PROTECTION (Specify type)</b> Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use. |                                                                 |                |
| <b>VENTILATION</b><br>Hood with forced ventilation                                                                                                             | <b>LOCAL EXHAUST</b><br>To prevent accumulation above the LEL   | <b>SPECIAL</b> |
|                                                                                                                                                                | <b>MECHANICAL (Gen.)</b><br>In accordance with electrical codes | <b>OTHER</b>   |
| <b>PROTECTIVE GLOVES</b><br>Plastic or rubber                                                                                                                  |                                                                 |                |
| <b>EYE PROTECTION</b><br>Safety goggles or glasses                                                                                                             |                                                                 |                |
| <b>OTHER PROTECTIVE EQUIPMENT</b><br>Safety shoes, safety shower, eyewash "fountain."                                                                          |                                                                 |                |

## SPECIAL PRECAUTIONS\*

### SPECIAL LABELING INFORMATION

DOT Shipping Name: Liquefied petroleum gas    DOT Hazard Class: Flammable gas  
DOT Shipping Label: Flammable gas    ID No.: UN 1075

### SPECIAL HANDLING RECOMMENDATIONS

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure ( < 250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional recommendations consult the Air Products Specialty Gas Catalog Safety and Technical Information Section or Compressed Gas Association Pamphlet P-1.

### SPECIAL STORAGE RECOMMENDATIONS

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area.

For additional recommendations consult the Air Products Specialty Gas Catalog Safety and Technical Information Section or Compressed Gas Association Pamphlet P-1.

### SPECIAL PACKAGING RECOMMENDATIONS

Isobutylene is noncorrosive and may be used with any common structural material.

### OTHER RECOMMENDATIONS OR PRECAUTIONS

Earth-ground and bond all lines and equipment associated with the isobutylene system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

\*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to assure that he is in full compliance.



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**aldrich chemical co.**

P.O. Box 355, Milwaukee, Wisconsin 53201 USA • (414) 273-3850

ATTN: SAFETY DIRECTOR

H2M HILL INC

P.O. BOX 428

CORVALLIS OR 97339

CUST # 150657 P.O. # C026730

DATE: 12/08/86

M A T E R I A L   S A F E T Y   D A T A   S H E E T   P A G E : 1

IDENTIFICATION

PRODUCT # 23670-5   NAME: PENTANE, ANHYDROUS, 99+%

CAS # 109-66-0

TOXICITY HAZARDS

RTECS # RZ9450G00

PENTANE

TOXICITY DATA

IVN-MUS LD50: 446 MG/KG

REVIEWS: STANDARDS, AND REGULATIONS

MSHA STANDARD-AIR: TWA 500 PPM (1475 MG/M3) DTLVS\* 3,200,71

OSHA STANDARD-AIR: TWA 1000 PPM FEREAC 39,23540,74

NIOSH REL TO ALKANES-AIR: TWA 350 MG/M3 MMWR\* 34(1S), 6S, 8S

REPORTED IN EPA TSCA INVENTORY, 1983

\*NIOSH MANUAL OF ANALYTICAL METHODS, 3RD ED. SEE: METHOD 1500

JPM SAE 67,566,78

HEALTH HAZARD DATA

ACUTE EFFECTS

HARMFUL IF INHALED OR SWALLOWED.

SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING,

WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND

VOMITING.

EXPOSURE CAN CAUSE:

NAUSEA, HEADACHE AND VOMITING

DAMAGE TO THE LUNGS

CAUSES EYE IRRITATION.

FIRST AID

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

CALL A PHYSICIAN.

WASH THOROUGHLY AFTER HANDLING.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

PHYSICAL DATA

MELTING POINT: -130 C

BOILING POINT: 35 C TO 36 C

SPECIFIC GRAVITY: 0.626

FLASH POINT: -57 F

EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.

DO NOT USE WATER.

SPECIAL FIRE FIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

FLAMMABLE LIQUID.

USA

Aldrich Chemical Co., Inc.  
340 West Saint Paul Avenue  
Milwaukee Wisconsin 53233  
Telephone (414) 273-3850  
Telex 255555 ALDRICH MI  
FAX (414) 273-4879

Belgium

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Telex 82302 Aldchem B  
FAX (02) 75 12 83

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Aldrich-Chimie S.r.l.  
27, Fosse des Treize  
F-67000 Strasbourg  
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Telex 880207 Aldrich F  
FAX (03) 3260131

Japan

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Kyodo Bldg. Shinjuku  
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Chiyoda-Ku, Tokyo  
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**M A T E R I A L   S A F E T Y   D A T A   S H E E T**

PAGE: 2

CATALOG # 23670-5

NAME: PENTANE, ANHYDROUS, 99+%

**UNUSUAL FIRE AND EXPLOSION HAZARDS**

EXTREMELY FLAMMABLE.

VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

----- **REACTIVITY DATA** -----

**INCOMPATIBILITIES**

OXIDIZING AGENTS

**HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS**

TOXIC FUMES OF:

CARBON MONOXIDE, CARBON DIOXIDE

----- **SPILL OR LEAK PROCEDURES** -----

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED**

EVACUATE AREA.

SHUT OFF ALL SOURCES OF IGNITION.

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.

COVER WITH AN ACTIVATED CARBON ADSORBENT, TAKE UP AND PLACE IN CLOSED CONTAINERS. TRANSPORT OUTDOORS.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

**WASTE DISPOSAL METHOD**

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

--- **PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE** ---

CHEMICAL SAFETY GOGGLES.

SAFETY SHOWER AND EYE BATH.

MECHANICAL EXHAUST REQUIRED.

RUBBER GLOVES

USE NONSPARKING TOOLS.

DO NOT BREATHE VAPOR.

AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION.

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.

MAY DEVELOP PRESSURE.

REFRIGERATE.

STORE UNDER NITROGEN.

STORE IN A COOL DRY PLACE.

----- **ADDITIONAL PRECAUTIONS AND COMMENTS** -----

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

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## ATTACHMENT 4

### STP SITE-SPECIFIC RADIATION PROCEDURES

**NOTE:** This section adopts and references procedures contained in the CH2M HILL Waste Management and Industrial Processes Discipline Health and Safety Program Manual Volume 2: Radiation Safety Manual, referred to as RSM manual. A copy of this manual will be available at the site at all times. In the text below, specific procedures within this manual are referred to as standards of practice (SOPs).

#### 1.0 Introduction

Recognizing possible risks from radiation exposure, recommendations on limits for exposures to members of the public have been issued by the International Commission on Radiological Protection (ICRP) and the U.S. National Council on Radiation Protection and Measurements (NCRP). These recommendations have been promulgated into standards and regulations by the U.S. EPA, the U.S. Nuclear Regulatory Commission (NRC) (Chapter 10 of the Code of Federal Regulations), and OSHA (OSHA; Chapter 29 of the Code of Federal Regulations). For work at DOE sites, the DOE has issued orders providing criteria for protection of health and safety and the environment. The goal of these recommendations, standards, and criteria is to minimize radiation exposures and risks to radiation workers.

The STP site investigation work will be performed in accordance with the criteria for members of the general population which are more than a factor of 10 below the occupational criteria specified in the DOE orders and OSHA and NRC regulations. Specifically, it is projected that the total individual radiation exposure as a result of site investigation field activities will be maintained below the DOE and NCRP criterion of 100 mrem/year for members of the general public. Occupational exposure limits are set at 5000 mrem/year.

#### 2.0 Radiation Protection Procedures

##### 2.1 Posting

Areas where radioactive materials are present and/or elevated radiation fields may be present, or have surface contamination greater than specified in Section 2.6 below (Table 2) below will be posted as **CAUTION CONTROLLED AREA**.

Areas that have external exposure rates: greater than 5.0 mrem in one hour, but less than 100 mrem in one hour, measured 30 cm from the source; or could cause exposure to greater than 100 mrem over 5 consecutive days will be posted **CAUTION RADIATION AREA**.

Areas that have surface contamination greater than 10 times those specified in Section 2.6 below (Table 2) below will be posted **CAUTION CONTAMINATED AREA**.

Areas where the potential exists for airborne radioactivity concentrations greater than 10% of the derived air concentration (DAC) will be posted **CAUTION AIRBORNE RADIOACTIVITY AREA**. Work operations which have the potential for creating airborne radioactivity concentrations levels in excess of 10% of the DAC are drilling, excavation, sampling of dry soils, decontamination, etc. The decision to post an area as an airborne radioactivity area will be based on site conditions, air sample results, and professional judgment and will be made by the SSC.

CH2M HILL employees must have health physics (HP) coverage (Section 2.2 below) to work in any controlled area, radiation area, contaminated area, or airborne radioactivity area.

Any posted area must be secured to minimize the potential for radiation exposure to the public.

## **2.2 Health Physics (HP) Coverage**

The project health physicist (George Stephens/ORO) will be the primary source of information and guidance for radiological controls that may be imposed on any task.

Specific responsibilities of the health physicist include:

- Interfacing with the project manager, the SSC and HP technicians to allow for a consistent personnel protective program that meets radiological, health, and safety requirements
- Identifying the type(s) of radiological monitoring equipment that will be used throughout the course of the project
- Advising the project manager, the SSC, and HP technicians of any changes to this plan, such as changes in monitoring protocol, PPE, and so forth
- Calculating radiation exposure using: monitoring information provided by the HP technicians; bioassay and dosimetry results; and employee self monitoring results

HP technicians will be assigned monitoring responsibilities for controlled areas, radiation areas, and contaminated areas. Constant HP technician coverage is required for drilling and other activities where radioactive contamination could be encountered. HP technicians will be available to determine if a radiological hazard exists or occurs at a task site.

Specific responsibilities of the HP technicians include:

- Determining natural background radiation exposure levels
- Delineating controlled areas, radiation areas, and contaminated areas
- Monitoring personnel and equipment for radiation exposure and contamination
- Attending safety briefings as required by the SSC

## **2.3 External and Internal Dosimetry**

The CH2M HILL Radiation Health Manager is responsible for ensuring that all personnel (employees, vendors, contractors, and visitors) are appropriately monitored for exposure to ionizing radiation. Each individual working at the STP site shall wear the CH2M HILL Landauer TLD Badge.

Section 9.3 of the RSM manual specifies the requirements for measurement of external radiation dose. TLDs will be processed on a quarterly basis.

Employees who work in work in posted **radiation areas** will use self-reading dosimeters (SRDs) as specified in SOP RP-04 in the RSM.

The Radiation Health Officer evaluates exposure data to verify that exposures are maintained at ALARA levels and transmits a summary exposure report to each participating CH2M HILL employee yearly. Personnel dosimeters shall meet the requirements of the DOE Laboratory Accreditation Program (DOELAP) or the National Voluntary Laboratory Accreditation Program (NVLAP).

Employees who work in posted **controlled areas** will participate in a routine bioassay program for measurement of internal radiation dose as specified in Section 9.3 and SOP RP-13 of the RSM manual. Onsite the SSC is responsible for implementation of the bioassay program. Bioassay results shall be returned to the RHM for evaluation. The RHM will send one copy of each bioassay report to the SSC and place one copy in the employee's permanent medical file.

The bioassay program for CH2M HILL personnel working on the RKP/STP projects includes collecting quarterly (or at a minimum, baseline and exit) samples for the analyses of isotopic uranium and radium-228. Ra-228 will be used as an indicator for potential Th-232 intakes. The resample level for Ra-228 will be 2 pCi/l (based on an 60 day sample frequency). Resample and evaluation levels for uranium will be the same as those shown in Table 13.1 of RP-13. Air samples will be used as the primary method of determining potential internal exposures to Th-232 and Th-228.

Employees who work in posted airborne radioactivity areas will be monitored using personal or general area air samplers. Air samples are to be collected as specified in RSM SOP RP-12. Procedures RP-06 and RP-07 address analysis of filter papers (including smear samples and air samples) for gross alpha and gross beta radioactivity. Instruments used for counting air samples will be calibrated and operated as described in Procedures RP-24 and RP-26 of the RSM.

## 2.4 Radiation Monitoring

Employees working in **controlled areas, radiation areas, contaminated areas, or airborne radioactivity areas** will be monitored for contamination periodically (at a minimum between collecting samples, at breaks, and prior to exit from the site) in accordance with RSM Manual SOP RP-08. Personnel monitoring in all areas listed above will be conducted by an HP Technician.

Employees working in **non-controlled areas** may use self-monitoring (Section 3.0 below) for at designated locations. This procedure applies only to areas with low contamination and does not apply to controlled areas, radiation areas, or contaminated areas.

Instruments or equipment (including sampling and heavy equipment) used in **controlled areas, radiation areas, contaminated areas, or airborne radioactivity areas** must be surveyed as specified in RSM manual SOP RP-06 and RP-07, prior to release from the site. Instruments or equipment used for well data or sample collection will be surveyed as they are withdrawn from the well or borehole.

Samples taken in **controlled areas, radiation areas, contaminated areas, or airborne radioactivity areas** must be surveyed as specified in RSM manual SOP RP-06 and RP-07, prior to release from the site. In addition to the surveys specified in RP-06 and RP-07, samples shall be surveyed using a SPA-8 Gamma Scintillation Detector (1 in. x 1 in. NaI detector or equivalent). A sample which shows an unshielded, contact SPA-8 reading of greater than  $1 \times 10^4$  cpm indicates that the "limited quantity" limits for that package may be exceeded. The sample must be split into portions less than or equal to 500 g each. Each 500 g portion must be shipped in a cooler containing only background activity samples. Samples with activity levels equal to or greater than the SPA-8 limit shown above shall be tagged with a radioactive

materials tag. This tag shall specify the unshielded contact, SPA-8 count rate, and indicate that special shipping procedures are required for this sample. These samples must also be screened for gross alpha and gross beta concentrations. Samples from controlled areas shall be shipped according to the RKP/STP Procedures for Shipment of Samples.

## **2.5 Radiation Work Permit (RWP)**

A radiation work permit, as specified in RSM manual SOP RP-05 is required in advance for work for which any of the following conditions are anticipated:

- If posting is required to control the spread of known or suspected contamination
- When an individual may receive a radiation dose in excess of 20 mrem to the total body or 300 mrem to the extremities during the work shift
- When an individual may be exposed to airborne concentrations of radioactive material in excess of 10% of the 40-hour week guide for that material (derived air concentration - DAC or maximum permissible concentration - MPC)
- When intrusive characterization efforts may encounter radioactive contaminants of unknown types and/or concentrations

If, while working in a posted area under an approved RWP, contamination is detected in excess of the limits specified on the RWP, work shall stop until the area is re-evaluated and a new RWP issued.

## **2.6 Action Levels**

Radiation action levels are specified in Tables 1 and 2. These criteria will be used to assess external exposure, and for assessing surface contamination and release of instrumentation, equipment, and PPE. Personnel contamination should be kept below detectable levels. PPE with detectable contamination shall not be reworn.

| Table 1 - External Radiation Exposure Action Levels                                  |                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radiation Level                                                                      | Action                                                                                                                                                                                                                                                                                                                                                                                            |
| Background to 2.0 mR/hr                                                              | Continue routine operations.                                                                                                                                                                                                                                                                                                                                                                      |
| 2.0 Mr/hr to 10 mR/hr                                                                | Alert level. Recheck proper operation of monitoring equipment. Monitor radiation level every 10 minutes. Minimize the potential for inhalation or ingestion of particulates. Notify the project manager and SSC. Determine the boundary for levels above 2.0 mR/hr and post as radiation area, at a minimum. If an RWP has not been issued for the area, work must stop until an RWP is approved. |
| Greater than 10 mR/hr                                                                | Provide for orderly shutdown of operations. Determine the boundary for levels above 2.0 mR/hr and post as radiation area. Notify project manager and SSC. Do not reenter area until HSP is amended.                                                                                                                                                                                               |
| Note: 2.0 mR/hr is approximation so as not to exceed 100 mrem in 5 consecutive days. |                                                                                                                                                                                                                                                                                                                                                                                                   |

| Table 2 - Action Levels <sup>a</sup> - Surface Contamination and Equipment Release |            |                                               |            |
|------------------------------------------------------------------------------------|------------|-----------------------------------------------|------------|
| Direct Survey - DPM/100 cm <sup>2</sup>                                            |            | Transferable Survey - DPM/100 cm <sup>2</sup> |            |
| Alpha                                                                              | Beta-Gamma | Alpha                                         | Beta-Gamma |
| 300                                                                                | 1000       | 20                                            | 200        |
| <sup>a</sup> No 100 cm <sup>2</sup> area greater than this value.                  |            |                                               |            |

| ACTION FOR TABLE 2                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If during any operation contamination is detected in quantities greater than the levels listed in Table 2, work shall stop unless an RWP has been approved, and the area has been posted as a <b>controlled area</b> .            |
| If during any operation contamination is detected in quantities greater than 10 times the levels listed in Table 2, work shall stop unless an RWP has been approved, and the area has been posted as a <b>contaminated area</b> . |

\*Action Levels in Table 2 are taken from Regulatory Guide 1.86 and are specified in RSM SOP RP-07 Table 1. The above Action Levels in Table 2 are more restrictive than those found in the Illinois Administrative Code, Section 340, Appendix C(a).

## 2.7 Decontamination

**Personnel and respirators:** Decontamination procedures as specified in RSM manual SOP RP-09 will be followed. Clothing and exposed skin surfaces shall be monitored as specified in RSM manual SOP HS-09. Special emphasis should be given to hands, shoes, and the cuffs of pants. Skin contamination shall be reported as specified. All removable contamination shall be removed. Fixed contamination should be reduced as much as reasonably possible, however, care shall be taken not to irritate or abrade the skin. If the skin cannot be cleaned with reasonable washing and brushing, the project manager and the SSC shall be informed and the advice of the HP and the CH2M HILL consulting occupational physician shall be obtained. Assuming that reasonable effort has been made to remove all removable contamination, the individual can be released from the site for the day. Removable activity should be removed from work clothing, and if clothing cannot be cleaned to the criterion it should be retained on the site.

**Equipment (including instruments, vehicles, and heavy equipment):** Decontamination procedures as specified in RSM manual SOP RP-10 will be followed. Equipment shall be checked for contamination, as specified in RSM manual SOP HS-06 and HS-07. If contamination is detected in quantities greater than the criteria specified in Table 2 above, reasonable efforts should be made to remove the contamination. Special attention should be focused on wheels and floor boards of vehicles. If the contamination is not removed after the application of reasonable effort, the release of equipment will be determined by the project manager and health physicist.

Heavy equipment (rig, trucks, tools, augers, rods, and other sampling equipment) will be decontaminated by steam cleaning at the steam cleaning pad. Equipment in controlled areas shall be surveyed for gross contamination levels (direct survey) prior to transport to the decontamination pad. Equipment with contamination levels greater than 10 times the levels shown in Table 2 shall be field decontaminated prior to movement to the decontamination pad. Results of field surveys of equipment shall be communicated to decontamination pad HP/IH personnel so that proper protective equipment can be specified prior to the start of steam cleaning.

Decontamination by steam cleaning will occur (1) during mobilization (2) between each well borehole, and (3) prior to demobilization from the site. Auger flytes, sampling tools, and so forth may be transported to the steam cleaning pad for decontamination.

## 2.8 Minimization of Airborne Radioactivity

Airborne radioactivity could potentially become a significant health hazard during soil excavations, particularly in dry, dusty soils. The following techniques will minimize airborne particulate exposures.

- Keep soil cuttings and excavation materials moist by using water sprays where possible.
- Excavate in a slow, controlled rate to minimize dust.
- Immediately place soil in a drum to control drying, and thereby control dust.
- Work upwind of excavation area.

### **3.0 CH2M HILL Self-Monitoring Procedure**

Self-monitoring for radioactive contamination will be implemented on a case by case basis for locations and activities with low potential for personnel exposure (detectable levels of contamination not expected). These locations and activities may include the decontamination pad(s); offsite well sampling and water level measurement activities; well development at certain locations; and other locations and activities as approved. Self-monitoring locations/activities shall be approved by George Stephens/ORO prior to implementation.

Self-monitoring will not be utilized in posted areas of known radioactive contamination or areas where it is expected that radioactive contamination could be encountered during field activities.

Self-monitoring will only be authorized for those individuals who have completed a self-monitoring training program that includes basic operation of the survey instruments; background/alert/alarm levels; response/notification actions; and documentation of results.

### **3.1 Responsibilities**

#### **CH2M HILL Health Physicist**

- Approve specific locations and activities for self-monitoring
- Specify instruments for self-monitoring
- Conduct/assist in training personnel for self-monitoring
- Conduct audits of self-monitoring program

#### **HP Technician**

- Set up and retrieve instruments at beginning and end of day
- Conduct daily source/operation checks on self-monitoring instrumentation (at beginning and end of each day) and maintain instrument records
- Assist/conduct self-monitoring training
- Maintain self-monitoring survey logsheets
- Conduct audits of self-monitoring program and report results to CH2M HILL

#### **CH2M HILL Personnel**

- Conduct self-monitoring at specified locations using the procedure outlined below
- Document survey results using signature sheet
- Report any detection of contamination or damage to instruments immediately to HP technician, SSC, or health physicist (George Stephens/ORO)

#### CH2M HILL RADIATION SELF-MONITORING PROCEDURE

1. Turn Ludlum Model 3 instrument on and place the switch to the BAT position. The indicator needle should deflect to the full-scale position. If the battery is not fully charged, the instrument should not be used. Contact HP technician or SSC to replace the batteries. **Do not use the instrument if it fails to respond to a battery check.**
2. Turn the switch to the x 0.1 position and check the instrument background. The background count rate should be approximately 50-100 counts per minute (cpm).
3. Place the G.M. detector next to the check source attached to the side of the instrument. The count rate should increase until it reaches full scale on the x 0.1 range. If the instrument does not respond to the source, contact the HP technician or SSC. **Do not use the instrument if it fails to respond to a source check.**
4. Use the same scale setting (x 0.1) for self-monitoring surveys. Survey hands, feet, and personal objects (notebooks, logs, and so forth) by moving the thin-end window G.M. detector slowly over the surface of the object. Be careful to keep the detector within approximately 1/4- to 1/2-in. of the surface, but do not touch the object being surveyed. (Note: The thin window on these instruments is very fragile and can be damaged by contact with small objects such as gravel on boots.)  
  
Observe the meter reading while surveying hands, feet, and other objects. If the meter reading exceeds 100 cpm above the background count rate, and the reading is consistent (not erratic), contact the HP technician or SSC for assistance.
5. Sign the self-monitoring survey logsheet to acknowledge that the survey was completed and no contamination was detected.
6. The HP technician will maintain records of self-monitoring logsheets.