Appendix F

Spill Prevention Control and Countermeasure Plan

Spill Prevention, Control And Countermeasure Plan

for

The Olympic Sports Complex at Mount Van Hoevenberg
Lake Placid, New York 12946
(518) 523-2811
Contact Person: Greg Stratford

Prepared by:

The LA Group, P.C.
40 Long Alley
Saratoga Springs, NY 12866
(518)587-8100

February 1999

CERTIFICATION

I certify that this Plan will be implemented as herein described. The Facility Manager or, in the managers absence, the senior Olympic Regional Development Authority employee on the site has the authority to implement any and all of the procedures described herein in the event of a real, threatened or perceived emergency.

Olympic Regional Development Authority Date

I certify that this plan has been prepared in accordance with good engineering practice and fulfills the requirements of the U.S. Environmental Protection Agency as set forth in 40 CFR Part 112.

DATE

P.E. SEAL

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1.0 GENERAL INFORMATION

1.1 Introduction

This Spill Prevention, Control and Countermeasure Plan (SPCC) is intended to fulfill the requirements of the U.S. Environmental Protection Agency (USEPA) in 40 CFR 112. If a release of fuel should occur, Olympic Regional Development Authority (ORDA) employees will respond to it and use the information contained herein to guide and assist in their response.

This Plan has also been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Parts 612, 613 and 614 Petroleum Bulk Storage (PBS) regulations. The regulations 6 NYCRR 613 and 614 pertain to the storage and management of petroleum products.

1.2 Site Description

The Olympic Sports Complex at Mount Van Hoevenberg is located approximately seven miles southeast of the Village of Lake Placid off NY Route 73 in the Town of North Elba, Essex County. A paved access road about one mile long leads southwest from NY Route 73 into the heart of the area.

The table below lists the petroleum product storage tanks currently existing and proposed for the facility. No. 2 fuel oil is used as fuel and to provide heat. The storage tanks are above ground steel tanks with a secondary containment dike.

Storage Tank Location	Contents	Tank Size (gallons)
Bob/Luge Maintenance Garage	gasoline	3,000
Bob/Luge Maintenance Garage	gasoline	2,000
Lamy Lodge @ Bobrun finish curve	fuel oil	5,000
Cross-Country Maintenance Garage	gasoline	2,000
Cross-Country Maintenance Garage	diesel	1,000
Cross-Country Maintenance Garage	fuel oil	2,000
Biathlon Lodge	fuel oil	1,000

1.3 Storage and Transfer Capacity

The fuel oil, gasoline and diesel are received at the facility via common carrier petroleum tank trucks, that connect to the fill line and transfer into the storage tanks. The fill line is arranged in such a way as to prevent gravity flow from the tank.

Gasoline is stored on the site in underground steel/carbon steel tanks.

1.4 Spill History

Each of the tanks are tested for tightness annually. The gasoline and diesel tanks are metered and have shown no indication of a leakage of fuel.

There is no recorded incidence of a release at this facility.

1.5 Arrangements for Outside Assistance

Local agencies and emergency response personnel may be requested to provide services in the event of an actual emergency. ORDA will contact the Essex County Sheriff and Lake Placid Volunteer Fire Department to familiarize them with the facility. The following information will be provided:

- Facility Layout
- Materials Handled
- Locations of Emergency Response Equipment
- Entrances to the Facility
- Copies of this SPCC

Appendix D includes the names, addresses and telephone numbers of the ORDA emergency response contacts.

2.0 PREVENTION AND CONTAINMENT

2.1 Facility Drainage

Storm water exits the facility by percolation and surface water drainage. Surface drainage is directed to a storm water system. The storm water system retains the majority of the runoff on-site.

The fuel storage tank(s) are located underground and are not affected by surface water runoff.

2.2 Anticipated Releases

The "worst case scenarios" for anticipated releases related to this facility are believed to be:

- Failure of a full tank (5,000 gallons of Fuel Oil).
- Release during loading of the tank(s).
- Release from feed pump and transfer lines.

A release outside the containment area could possibly enter into the storm water system. In this case, ORDA facility personnel will respond to mitigate the impact by containing, absorbing and removing the released materials. Any flow into the system will be minimized by diverting the fuel. Materials used to contain the fuel will be put into containers and shipped off-site to a licensed disposal facility.

2.3 Over-fill Prevention

Measures to prevent over-fill will be employed for these storage tank(s). These are the only areas where filling is performed. Over-fill preventive measures include:

- High Level Alarm (electronic)
- Tank Gauge

These measures will minimize potential overfill of tanks.

2.4 Maintenance

The Facility Manager will establish and supervise all preventative maintenance procedures. The Manager will establish a regular procedure to assure that any required maintenance work is properly performed and that maintenance records are accurate and current. Facility personnel will perform all preventative maintenance on the facility except major, non-routine tasks. All such maintenance will be documented and there will be a periodic review of all maintenance by the Facility Manager.

The maintenance program will include, but not be limited to, exercising all valves, checking pumps, performing regularly scheduled equipment maintenance, routine inspections and housekeeping. The Chief Engineer will perform periodic facility inspections to ensure that the Facility Manager is performing required inspections and maintenance.

2.5 Transfer Measures

Protective measures to be taken during transfer of oil from tanker truck to tank(s) include those previously noted plus:

- Signs: No Smoking, No Open Flame, Set Handbrake and Engine Off.
- Inspections by facility personnel during transfer operations.
- Drip Prevention using drip pans, funnels and drybreak couplings.

2.6 Inspections

Storage tank(s) will be inspected on a monthly basis by the Facility Manager with additional inspections performed by facility personnel who will be routinely working in the area of the storage tank(s) and will be able to notice any incidental release. Inspection procedures and a documentation form are in Appendix C. All such records will be retained in the Facility Manager's office available for NYSDEC and/or USEPA inspection.

The Operations Director, in conjunction with the Facility Manager, will make a decision regarding the temporary or permanent closure of the storage tank if inspection results warrant such, or if the tank is out-of-service for 30 days or more in accordance with 6 NYCRR 613.9.

2.7 Security

This facility is normally attended on a 24-hour basis. Pump controls and valves that are not in service are normally locked to prevent tampering. Out-of-service lines will be capped and marked. The facility is routinely patrolled by ORDA personnel.

Facility lighting is provided for both operational and security purposes. It provides adequate illumination to detect and respond to a release within the active areas of the facility.

2.8 Training

Facility personnel will be trained to become familiar with this plan, the location and the proper use of emergency equipment, proper phone procedure for contacting critical personnel and various other response procedures. Personnel will be instructed in fire emergency procedures, proper fire extinguisher use and fire safety issues. Training also will be given on the use of the containment equipment (See Appendix B) to insure proper handling of a release.

3.0 RESPONSE, CLEANUP AND REMOVAL

3.1 General Procedures

The subsections which follow describe response actions directed to specific types of events in defined areas. A description of Emergency Response Procedures for the facility is in Appendix A and a list of Emergency Contacts, including the site Emergency Coordinator, is in Appendix D. The equipment available to implement response actions is listed in Appendix B.

If during an emergency situation the facility's Emergency Coordinator or Police or Fire Department officials deem an evacuation necessary or advisable, the Emergency Coordinator will organize the evacuation.

3.2 Release Outside the Containment

It is intended that this SPCC plan function as a guide to the organized and quick response by ORDA personnel in the rare event of a release. After containment has been completed (e.g., with absorbent and/or temporary earthen berms), cleanup will begin. Cleanup will consist of removing contaminated soil and debris and placing it on a paved surface or in a container pending off-site disposal.

APPENDIX A

EMERGENCY RESPONSE PROCEDURES

EMERGENCY COORDINATOR

An Emergency Coordinator will be available at all times, either on the facility premises or on-call (See Emergency Contacts List Appendix D). The Emergency Coordinator will be responsible for coordinating all emergency response measures and will have full authority to commit all resources needed to carry out the measures herein described. Each Emergency Coordinator will be thoroughly familiar with this SPCC Plan, all operations and activities at the facility, the location and characteristics of the materials handled, the location of all facility records, the facility layout, and the location of all emergency response and spill clean-up equipment.

a) Immediate Responsibilities:

In the event of an imminent or actual emergency, the Emergency Coordinator will immediately:

1) Activate internal facility alarms and/or communication systems to notify all facility personnel.

2) Ensure that all facility personnel are accounted for and isolated from danger.

3) Notify the local Fire and Police Departments.

4) Arrange for emergency services (EMT, ambulance) for any injured personnel.

5) Assess the extent of the emergency.

6) Notify 24-hour NYSDEC Spill Hot Line 1-800-457-7362. This must be performed within 2 hours of the release.

7) Notify the NYS Police at (518) 897-2000, if necessary.

b) Identification and Assessment

The Emergency Coordinator will identify the character, exact source, amount and extent of released materials through:

1) Direct observation

2) Review of operating records

3) Interviews with witnesses

The Emergency Coordinator must also assess the possible hazards to human health and/or the environment that may result from any release or fire (the threat of fire in the event of a release, the effects of gases generated in a fire, etc.) and must consider both direct/indirect effects of an actual or potential release or fire.

c) Danger Outside the Facility

If the emergency has the potential to threaten human health or the environment outside the facility, the Emergency Coordinator will immediately notify the National Response Center at 1-800-424-8802, providing the following information:

1) Name and telephone number of reporter.

2) Name and address of the facility.

3) Time and type of incident (e.g. release, fire, etc.).

4) Name and quantity of material(s) involved.

5) The extent of injuries, if any, if known.

6) The possible hazards to human health or to the environment outside the facility.

d) During an Emergency

The Emergency Coordinator will take mitigative measures, such as stopping the operation or isolating spillages, to ensure that fires or releases do not occur, recur or spread to other areas at the facility. If the facility halts operations, the Emergency Coordinator will monitor for leaks, vapor or gas generation.

The implementation of emergency procedures is the responsibility of the Emergency Coordinator. In the event of an imminent or actual emergency, the following procedures must be adhered to:

1) The Emergency Coordinator will activate the internal facility alarms and/or communication systems to notify personnel to implement emergency procedure.

2) When necessary, the Emergency Coordinator will immediately notify the Lake Placid Volunteer Fire Department and Essex County Sheriff and New York State Police Departments and the NYSDEC Spill Hot Line (1-800-457-7362). The Emergency Coordinator will be prepared to report:

- Name and telephone number of reporter;
- Name and address of the facility;
- Time and incident type (e.g. release, fire, etc.);
- Probable source of any release;
- Name and quantity of material(s) involved, if any;
- The extent of injuries, if any;
- Location of any discharge (geographic and in relation to North Creek);
- The possible hazards to human health, safety, welfare or the environment outside the facility.

3) The Emergency Coordinator will also notify the local hospital.

e) After an Emergency

After an emergency, the Emergency Coordinator will:

- Supervise the cleanup efforts and ensure that the recovered released material is properly stored and treated or disposed.
- Ensure that no material which may be incompatible with the released material is stored or disposed with or near it.
- Make sure emergency equipment is cleaned, recharged, reactivated and fit for its intended use.
- Ensure that all reporting and notification requirements of the NYSDEC and/or the USEPA have been carried out.

EMERGENCY PROCEDURES

Should an emergency situation arise, the Emergency Coordinator will be notified immediately. Subsequently, all facility personnel, federal, state or local agencies and contractor will be notified as specified in this Plan.

Release Emergency Procedures

In the event of a release of any kind, the following general steps will be followed:

1) Determine its source, character and extent, and the area affected or likely to become affected.

2) Notify the Emergency Coordinator.

3) Shut down operations if the operator's help is needed or the release is in or near their area. (After operations have been stopped, the Emergency Coordinator or designated assistant will monitor for leaks, gas generation and ruptures in valves, pipes or other equipment, wherever appropriate).

4) Eliminate all sources of ignition from the release area and areas downwind of it. Remove trucks and other vehicles from the area if the Emergency Coordinator determines it can be done safely. (The Emergency Coordinator will make the decision concerning moving vehicles based on the proximity of vehicles to the release and the adequacy of ventilation in the area.) Vehicles will not be allowed to enter the affected area until authorized to do so be the Emergency Coordinator. Also, any other equipment which may be sources of ignition may be shut down at the discretion of the Emergency Coordinator.

5) Summon aid (Fire Department, Rescue Squad) where required.

6) Position ABC type fire extinguishers near immediate clean-up area.

7) The Emergency Coordinator will assess possible hazards to human health and the environment. Releases and/or fires in the vicinity of the vessel or vehicles may result in the following types of direct and indirect effects on human health and the environment:

    a) Ingestion of materials may result in toxic health effects;

    b) Liquid runoff may be combustible, or may pose a threat to ground or surface water;

    c) Contact with the substance may irritate the skin and eyes;

    d) Surface runoff from the spill and fire fighting apparatus may be harmful to area vegetation, aquatic life and drinking water supplies;

e) Fires involving the substance may generate potentially toxic fumes on-site and off-site and

f) Odors may migrate to neighboring industries and residences.

Facility personnel who may have been exposed to releases of substances will undergo periodic physicals to assess possible health hazards resulting from such exposure.

Possible environmental hazards will be determined by analysis of soil samples taken from the spill areas.

8) Employees involved in clean-up will wear appropriate emergency equipment as directed by the Emergency Coordinator. (This can include boots, gloves and eye and respiratory protection.)

9) Stop point source to contain release in the smallest area possible. If the source is a leaking tank, pump the contents of the leaking or ruptured tank into another tank if possible. (Following the incident, the tank will be taken out-of-service and inspected to determine if it can be repaired. If not, it will be removed from service in accordance with NYSDEC regulations.)

10) Dike any liquid with standard industrial absorbent (pads, pillows and/or booms) as required. Pay special attention to prevent flow from entering storm drains.

11) Collect contaminated material. Use portable pumps or vacuum truck to recover liquid material. Absorb nonpumpable material with standard industrial absorbent. Use shovels to uniformly disperse absorbent over the affected area. For a release into the soil, stained dirt will be removed.

12) Decontaminate or dispose of protective equipment used during the clean-up.

13) Clean, restore, or replace emergency response equipment and return it to its original location.

14) Label used recovery drums in accordance with all applicable rules and regulations and manage properly.

15) Observe proper hygiene procedures during personal decontamination.

16) Manage all collected contaminated soil and/or water in accordance with applicable regulations.

Fire Emergency Procedures

To minimize the possibility of fires, smoking, welding (except by permit), open flames or other sources of ignition are NOT allowed in the storage, loading or unloading areas of the facility. All personnel will be trained in the use of fire extinguishers and emergency equipment to make them more fully aware of the dangers of fire.

The following is the emergency procedure to be implemented in the event of a minor spill or fire:

1) Sound the alarm and/or communicate the need for help.

2) Use the proper class of fire extinguisher to extinguish the flames. If unable to immediately extinguish the fire, close the door (if in a building) and leave the area. If the fire is not extinguished, follow the procedures below for a Large Fire Emergency.

3) If the fire is extinguished, notify Emergency Coordinator.

4) Eliminate and continue to restrict all sources of ignition so that the fire will not re-ignite.

5) Wear Personal Protective Equipment (boots, protective gloves and eye protection) when stopping any leak or absorbing any released materials.

6) Follow the release clean-up procedures described above.

Large Fire Emergency Procedures

The following emergency procedures will be implemented in the event of a large fire:

1) Notify the Emergency Coordinator.

2) Call the Lake Placid Volunteer Fire Department at (518) 523-2535. Describe the situation, type and quantity of material involved, location and caller's name.

3) Shut down all operations, if possible. Once facility operations have been stopped, the Emergency Coordinator will monitor for leaks, pressure buildups, and ruptures in valves, pipes or other equipment.

4) All personnel who may be endangered by the fire, except those designated by the Emergency Coordinator, will evacuate the facility upon sounding of the alarm.

5) When the Lake Placid Volunteer Fire Department arrives, the Emergency Coordinator will delegate primary responsibility to them and will standby to offer assistance.

6) The Emergency Coordinator and the Fire Department will determine the most accessible and safest route of approach to the fire, considering flame migration potential, associated dangers and physical limitations.

7) Designated personnel will control runoff from the fire-fighting activities using dikes, booms, or other appropriate equipment, to minimize release to environment.

8) When the fire is extinguished, remedy the point source of the release to stop all flow if it can be done without risk. Absorb liquid materials and/or pump to available truck. Use shovels to disperse standard industrial absorbent over the affected areas. Collect contaminated materials (such as absorbent, dry chemical, or rags) in recovery drums.

9) Decontaminate boots, gloves and other reusable emergency response equipment.

10) Clean, restore or replace emergency response equipment, and return it to its original location.

11) Label used recovery drums in accordance with all applicable rules and regulations and manage properly.

12) Observe proper hygiene procedures during personal decontamination.

13) All collected contaminated materials, soil and/or water will be managed in accordance with applicable regulations.

INCIDENT REPORTS

Within seven (7) days of any non-minor incident requiring the implementation of this SPCC, a written report will be submitted to the NYSDEC by the Corporate Safety, Health and Environment Manager. The report will include at least the following:

1) Name, address and telephone number of the facility;

2) Name, address and telephone number of the owner/operator of the facility;

3) Incident date, time and type (fire, explosion, spill, etc.);

4) Type and quantities of materials involved;

5) Extent of any injuries;

6) Assessment of actual or potential hazards to human health, safety or the environment;

7) Estimated quantity and disposition of recovered material;

8) Proposed measures to prevent incidents in the future.

Also the time, date and details of the incident will be recorded in the facility's operating records.

RESUMPTION OF OPERATIONS

Prior to resuming normal operation, the Emergency Coordinator will ensure that all emergency equipment is inspected and returned to operating condition. The Emergency Coordinator must notify the NYSDEC and the local officials that all clean-up procedures are complete, and that all emergency equipment and systems are fit for their intended use. Operations will not resume until there is no longer a threat to public health, safety or welfare, or the environment.

Following the clean-up operation, an assessment will be made as to the proper management of recovered materials. If necessary, tests will be made to ensure proper handling and disposal of all materials.

MEDICAL EMERGENCIES

First Aid equipment will be maintained on-site. The general response to injuries is as follows:

1) If certified in First Aid, examine person for injuries, treating any minor injuries as prescribed.

2) If major injuries are evident Call For Emergency Medical Care (See Emergency Contact List for appropriate telephone numbers).

3) Do Not Move injured unless there is imminent danger.

4) If injured is not breathing, administer artificial respiration, but only if CPR Trained.

5) Keep victim warm, await arrival of emergency medical care unit.

6) In case of contact with spilled materials, first check with MSDS before administering First Aid; if absolutely necessary, remove and isolate contaminated clothing & shoes.

CONTINGENCY DATA

Petroleum Based Liquids

Hazards: Combustible, if exposed to or involved in fire. May irritate skin and eyes on contact. If swallowed, causes nausea or vomiting. May be toxic. Poses threat to ground/surface water.

Personnel Protection: Wear non-porous gloves and eye protection when handling.

Storage: Away from ignition sources.

Release Response: Eliminate ignition sources. Stop source if possible. Stay upwind to avoid breathing vapors. Pump/absorb released material.

Fire Fighting: dry chemical, foam, carbon dioxide, or water fog to extinguish fire.

First Aid (Skin): Wipe off and wash with soap and water.

First Aid (Ingestion): Do Not Induce vomiting. Call for immediate medical assistance.

First Aid (Eyes): Flush with large amounts of water for 15 minutes and seek medical attention ASAP.

Oily Solids (dirt, sand, and other solid debris from cleanup work)

Hazards: Material may be toxic if absorbed or ingested. Liquid runoff from material may be combustible, toxic, or may pose threat to groundwater or surface water.

Personal Protection: Wear non-porous gloves and eye protection when handling.

Storage: Away from ignition sources.

Release Response: Shovel material into containers, trucks, etc. Absorb free liquids with appropriate materials.

Fire Fighting: Use dry chemical, foam, carbon dioxide or water in flooding quantities to extinguish any fire.

First Aid (Skin): Wipe off and wash with soap and water (Lis-toil works well).

First Aid (Ingestion): Do Not Induce vomiting. Call for immediate medical assistance.

First Aid (Eyes): Flush with large amounts of water for 15 minutes, seek medical attention as soon as possible.

APPENDIX B

EQUIPMENT LIST

EQUIPMENT LIST

Equipment	Capability
Absorbent - 4 Boom/Tubes 8 ft. long	Contain and Absorb Spills
Absorbent Pads - 2 Bags @ 50 ea.	Absorb Spills.
Hand Tools - 2 Shovels - 2 Squeegees - 2 Brooms and absorbent.	Aid distribution of absorbent, used for cleanup of spills.
Absorbent Speedy-Dri - 2 Bags @ 50 lbs.	Absorb Spills

APPENDIX C

INSPECTION PROCEDURES
and
RECORD KEEPING

INSPECTION PROCEDURES

Item	Method	What to look for
Valves, Flanges Piping, Pump	Visual	Leakage, misalignment damage, locks in place
Instrumentation	Visual	Proper function, liquid levels
Transfer Areas	Visual	Leakage, spillage, hose damage or deterioration
Tank	Visual	Leakage, liquid in secondary containment, structural damage
	Tapping	Corrosion, cracks, coating damage, buckles, or bulges
Vents	Visual	Obstruction
Emergency Equipment	Visual	Check contents of storage area and replenish if needed.

ORDA INSPECTION RECORDS	LOCATION Olympic Sports Complex at Mount Van Hoevenberg

Inspection Date	Inspector's Initials	Satisfactory (Y/N)	Comments

APPENDIX D

EMERGENCY CONTACTS LIST

EMERGENCY CONTACTS LIST

The following are addresses and telephone numbers of local, state and national emergency response teams and Government agencies. Copies of the National Response Center, police, fire and hospital telephone numbers will be posted at all key facility telephones.

PRIMARY EMERGENCY RESPONSE SERVICES:

Name	Location	Telephone
Lake Placid Fire Department Placid Memorial Health Center	River Street Extension Lake Placid, NY 12946 Church Street Lake Placid, NY 12946	Non Emergency - (518) 523-3211 Emergency - (518) 523-2535 (518) 523-1717
Adirondack Medical Center	Saranac Lake, NY	(518) 891-4141
New York State Police	Ray Brook, NY 12977	(518) 897-2000
NYSDEC Spill Hotline		24 hrs/day - (800) 457-7362
National Response Center Oil & Toxic Chemical Spill		(800) 424-8802
SPILL RESPONSE TEAMS:		
MC Environmental Services (Primary)	22 Hudson Falls Road South Glens Falls, NY 12803	(518) 747-3050
Clean Harbors (Secondary)	32 Bask Road Glenmont, NY 12077	(518) 434-0149
FACILITY EMERGENCY COORDINATORS:		
Primary Contacts		
Facility Manager Thomas Colby	office: ORDA - Ski Jump Complex Lake Placid, NY 12946	(518) 523-2202
	home: 39 1/2 Saranac Avenue Lake Placid, NY 12946	(518) 523-7507
Assistant Manager Fay Gonyea	office: Olympic Sports Complex Lake Placid, NY 12946	(518) 523-4436
Plant Operator Greg Stratford	office: Olympic Sports Complex Lake Placid, NY 12946	(518) 523-2811 Home: (518) 891-3384

Chris Conway

office:
Olympic Regional Development
Authority
216 Main Street
Lake Placid, NY 12946

(518) 523-1655

Appendix G

Construction Pollution Prevention Plan

CONSTRUCTION POLLUTION PREVENTION PLAN

for

The Olympic Sports Complex at Mount Van Hoevenberg
Lake Placid, New York 12946
(518) 523-2811

Operator:

Olympic Regional Development Authority
Main Street
Lake Placid, New York 12946

Prepared By:

The LA Group, P.C.
40 Long Alley
Saratoga Springs, New York 12866

February 1999

CONSTRUCTION POLLUTION PREVENTION PLAN

SITE DESCRIPTION			
Project Name and Location: (Latitude, Longitude, or Address)	Olympic Sports Complex at Mount Van Hoevenberg Improvements and Expansion Latitude 44° 13'00" Longitude 73° 56'00"	Owner Name and Address:	Olympic Regional Development Authority Main Street Lake Placid, New York 12946
Description: (Purpose and Types of Soil Disturbing Activities)	Maintenance of existing cross-country ski trails and trail bridges, grading of parking areas, cross country stadium straightaway lengthening, relocate timing building, and combined bobsled/luge run construction (includes demolition of old luge run)..		
Site Area: 1,594 acres	Area affected by construction: 9 acres		small areas throughout the site added together totaling approximately 9 acres.
Sequence of Major Activities:			

Relevant activities will take place in 5 phases over a 5 year period:

Phase I.

Construction of a new combined bobsled/luge run.

Phase II.

Rehabilitation and expansion of the cross-country ski lodge.

Phase III.

Providing snowmaking on portions of cross-country ski trails. Grade parking areas adjacent to ski lodges. The addition of biathlon course amenities including and rehabilitation of the biathlon course target change structure and the biathlon lodge. Lengthening of straightaway at the cross-country stadium and relocating of timing building. Construction of an equipment storage barn. On-going improvements to the cross-country trails, trail bridges, complex circulation and landscaping.

Phase IV.

Work begun in previous phases will be continued. Construction of the combined bobsled/luge run will be completed.

Phase V.

The updated UMP work plan will be completed. Routine maintenance projects will continue to occur.

SITE DESCRIPTION (CONT'D)

The sequence of trail construction is outlined below. In general, about 9 acres of terrain will be cleared, graded, seeded, and mulched. Work will be completed in each manageable section of trail before work begins on a new section of the trail.

1. Construction equipment will be staged in an area close to a work road, in order to keep movement of the equipment to a minimum.
2. The boundaries of the trail will be flagged and then brushed out.
3. Trees are cut with chainsaws, skidded to a central location and chipped or salvaged. Stumps are pulled out, preferably with a tracked backhoe.
4. Stumps, other non-chippable pieces of wood, and large rocks and boulders will be used to fill depressions and areas downslope of steep ledges. If a pocket of soil suitable for use as fill is found, it will be excavated and the resulting hole will be filled with stumps and boulders.
5. If possible, the cleared area will be graded smooth using a bulldozer. In steep places, no grading by machine will be done; instead, the trees stumps are cut flush with the ground and other work is done by hand to make the surface as smooth as possible.
6. On steep trail segments, haybale rows, several bales deep, are constructed across the slope to act as temporary water bars and filter barriers.
7. The trail is seeded with a restoration grass mixture and mulched with hay.

See attached map showing areas to be affected.

Name of Receiving Waters: North Meadow Brook

CONTROLS

Erosion and Sediment Controls

Stabilization Practices

The general erosion control practices will be similar in each area where ski trails will be maintained, or where soil will be disturbed by other construction activities.

In all construction zones the limits of grading will be staked out as part of the start of construction. Following stake out, the perimeter of downslope limits of construction in steeply sloped and adjacent wetland areas will be established with filter fabric fence line to contain erosion spoil. If necessary, spoil piles will be located within the construction zone and will be used for temporary storage of excavated materials which will be used as backfill within thirty days.

In areas of long-term construction and or repeated disturbance, the silt barrier will be constructed of filter fabric wrapped hay bales.

In sequence with the completion of a construction phase, restoration will be completed. Restoration will include regrading to match pre-existing contours or provide for adequate drainage. Once grading is completed, areas of disturbance will be seeded with restoration grasses. Two mixes are proposed with Restoration Mix 1 being adapted to full sun conditions and Restoration Mix 2 is a shade tolerant mix.

Following seeding, the excavated area will be mulched with hay at a rate of 100 pounds per 1000 sq. ft.

To minimize the need for structural practices for flow diversion, the site design has minimized the area of grading proposed, and has minimized the use of impermeable surfaces.

Structural Practices

Where blasting is required, small diameter drilling with high-speed equipment shall be utilized. Blasting mats shall be installed if overburden is not available. Prior to blasting, the contractor shall contact adjacent landowners to determine the proximity of existing drinking water wells such that appropriate precautions may be taken to prevent damage to any such wells.

Residents within a one-half mile radius of the site will be notified in advance of blasting events, if requested. The applicant will formally contact nearby residents to ensure all persons requesting notification are identified. Blasting will occur between the hours of 10:00 am to 5:00 pm only. All blasting will be conducted by a qualified licensed blaster pursuant to the applicable requirements of the State of New York and federal governments. Blasting will not occur during adverse weather conditions such as high winds unless a loaded charge must be detonated before the end of the day. Shots will be designed to minimize ground vibration and air blast.

There are no common drainage locations which serve an area of ten or more acres of disturbed areas at one time. Silt fences and other sediment controls described in "Stabilization Practices" above will be utilized on side slope and downslope boundaries of the construction areas.

OTHER CONTROLS

Waste Disposal:

Waste Materials: Waste materials generated during construction will be disposed at a suitable landfill, transfer station or C&D landfill. The closest transfer station is located on Dump Road off Route 73 in North Elba. An active C&D landfill is located at this same site. The crushed concrete from demolition of the luge run will be used for drainage rock, roadways, fill for ski wax test hill construction, etc., on-site. The ammonia supply lines on the luge and bobsled runs will be abandoned in place. The lines will be flushed and the runoff will be collected, neutralized, and trucked off site to an appropriate handling facility.

Hazardous Waste: It is not anticipated that any hazardous wastes will be generated during construction. If any are generated a licensed hazardous waste carrier will be contracted with to dispose the hazardous material at a suitable disposal site.

Sanitary Waste: Portable sanitary facilities will be made available to construction personnel at various locations and will be serviced regularly.

Offsite Vehicle Tracking

Gravel pads will be provided at each entry area onto any public roadways.

TIMING OF CONTROLS/MEASURES

Stormwater management has been incorporated into the project planning. Temporary silt fence is to be installed prior to construction initiation. All other stormwater devices will be installed as part of each facility. Disturbed areas will be reseeded within 14 days of construction completion. Temporary silt fences will not be removed until the area is revegetated.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

The Construction Pollution Prevention Plan was prepared in accordance with the New York State Department of Environmental Conservation SPDES General Permit for Stormwater discharges from Construction Activities that are classified as "Associated with Construction Activity" pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. This SPDES General Permit implements The Federal Clean Water Act pertaining to stormwater discharges. Essex County and the Town of North Elba do not have specific ordinances relating to stormwater management and soil and erosion control.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspections and maintenance practices that will be used to maintain erosion and sediment controls:

The construction manager will supervise day-to-day activities on the site. The project engineer will make at least weekly inspections, and following any storm event of 0.5 inch or greater.

All measures will be maintained in good working order; if repair is necessary, it will be initiated within 24 hours of report.

Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.

Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.

Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth. If necessary, spot reseeding will be implemented.

A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.

Non-Storm Water Discharges

Any water pumped from excavations will be pumped to a temporary dewatering basin established in an upland area.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

Petroleum for fueling vehicles is stored in under ground storage tanks at the Bobsled/Luge Maintenance Garage and the Cross-Country Maintenance Garage at the Olympic Sports Complex at Mount Van Hoevenberg.

Hydraulic oil and lightweight cutting oils will be stored in their original containers.

SPILL PREVENTION

Material Management Practices

The following good housekeeping practices will be followed onsite during the construction project; these practices will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

- An effort will be made to store only enough product required to do the job
- All the materials stored onsite will be stored in a neat, orderly manner in their appropriate containers, and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of a product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite
- The contractor shall prohibit washing of tools, equipment, and machinery in or within 100 feet of any watercourse along the construction corridor, and install sediment traps to filter runoff from washing operations that will enter any watercourse.

Hazardous Products:	

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data will be retained; they contain important product information
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Product Specific Practices

The following product specific practices will be followed onsite:

Petroleum Products:	

1. Construction personnel should be made aware that emergency telephone numbers are located in this CPPP.
2. The contractor shall immediately contact NYSDEC in the event of a spill, and shall take all appropriate steps as outlined in the site specific Spill Prevention, Control and Countermeasure Plan to contain the spill including construction of a dike around the spill and placing absorbent material over the spill.
3. The contractor shall instruct personnel that spillage of fuels, oils, and similar chemicals must be avoided.

SPILL PREVENTION (Continued)

4. Fuels, oils, and chemicals will be stored in appropriate and tightly capped containers, containers shall not be disposed of on the construction site.

5. Store fuels, oils, chemicals, material, and equipment and locate sanitary facilities away from trees and at least 100 feet from streams, ponds, wells, wet areas, springs used as potable water supplies, and other environmentally sensitive sites.

6. Dispose of chemical containers and surplus chemicals off the construction site in accordance with label directions.

7. Use tight connections and hoses with appropriate nozzles in all operations involving fuels, lubricating materials or chemicals.

8. Use funnels when pouring fuels, lubricating materials or chemicals.

9. Refueling and cleaning of construction equipment will take place from access roads, in staging areas or along roadside areas whenever practical to provide rapid response to emergency situations.

10. All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Any vehicle leaking fuel or hydraulic fuel will be immediately removed from the site.

Fertilizers:

No fertilizer is proposed to be stored onsite.

SPILL PREVENTION (Continued)

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies. Any spill in excess or suspected to be in excess of five gallons will be reported to the NYSDEC Region 5 Spill Response Unit. Notification to NYSDEC (1 800/457-7362) must be completed within two hours of the discovery of the spill.

- Materials and equipment necessary for spill cleanup will be kept in the material storage are onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substance.

- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.

- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

Spill Response Report

Within 2 hours of a spill discovery the following must be notified. Telephone numbers are located in Appendix C of the Spill Prevention, Control and Countermeasure Plan.

1. NYSDEC Region 5 Spill Response Unit
2. Spill Contractors
3. Olympic Sports Complex at Mount Van Hoevenberg
4. ORDA

Material Spill:	Approximate Volume:
Location:	
Distance to nearest down gradient drainage way:	
Distance to nearest down gradient open water:	
Temporary control measures in place:	

POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Name: _____

Title: _____

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature For Responsible for

_____

Date: _____

_____

Date: _____

_____

Date: _____

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR MORE

INSPECTOR: _____ DATE: _____

INSPECTOR'S QUALIFICATIONS:

_____

_____

_____

_____

DAYS SINCE
LAST RAINFALL: _____

AMOUNT OF
LAST RAINFALL _____ INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DSTRBNCE	STBLZD? (Y/N)	STBLZD WITH	CONDITION

STABILIZATION REQUIRED:

_____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

DATE: _____ COMPONENT(S): _____

FROM	TO	IS COMPONENT STABILIZED?	IS THERE EVIDENCE OF WASHOUT OR OVER-TOPPING?

MAINTENANCE REQUIRED FOR COMPONENT:

_____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

SEDIMENT BASIN

DEPTH OF SEDIMENT IN BASIN	CONDITION OF BASIN SIDE SLOPES	ANY EVIDENCE OF OVERTOPPING OF THE EMBANKMENT?	CONDITION OF OUTFALL FROM SEDIMENT BASIN

MAINTENANCE REQUIRED FOR SEDIMENT BASIN:

_____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

OTHER CONTROLS

STABILIZED CONSTRUCTION ENTRANCE:

DOES MUCH SEDIMENT GET TRACKED ON TO ROAD?	IS THE GRAVEL CLEAN OR IS IT FILLED WITH SEDIMENT?	DOES ALL TRAFFIC USE THE STABILIZED ENTRANCE TO LEAVE THE SITE?	IS THE CULVERT BENEATH THE ENTR. WORKING?

MAINTENANCE REQUIRED FOR STABILIZED CONSTRUCTION ENTRANCE:

_____

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

REASONS FOR CHANGES:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best on my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE: _____ DATE: _____

Appendix H

Ammonia Spill Plan

SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

Prepared for:

Olympic Regional Development Authority
Olympic Center
Lake Placid, New York 12946

April, 1993

Prepared by:

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS, SURVEYORS, PLANNERS,
& LANDSCAPE ARCHITECTS
Mirror Lake Drive
Lake Placid, New York

(518) 523-9000

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FIGURES

Figure 1: Release Incident Form
Figure 2: Regulatory Agency Reporting Log
Figure 3: Site Location Map
Figure 4: Pumphouse Plan
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APPENDICES

Appendix 1: Material Safety Data Sheet for Ammonia
Appendix 2: Site Plan

TABLES

Table 1: Hazard Level vs. PPE

PREFACE

The Olympic Regional Development Authority (ORDA) has instituted this Spill Prevention, Control and Countermeasures Plan in order to provide an effective and organized procedure to prevent and/or control a spill of ammonia, and to protect the health and safety of its employees, its visitors, the community and the environment in the event of an ammonia spill at the Mt. Van Hoevenberg Recreational Area. This Plan allows for rapid response to ammonia releases and provides direction for handling release situations. This document represents the most practical measures that will minimize the potential for significant releases of ammonia to the environment.

For the purpose of this Plan, a release of ammonia is defined by regulations as, but not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.

This Plan is divided into two major parts. The first part covers emergency response procedures; the second covers spill prevention. This Plan is available for inspection by employees, their representatives, and authorized government personnel.

PART I: EMERGENCY RESPONSE PROCEDURES

1.0 EMERGENCY ALERTING AND RESPONSE PROCEDURES:

1.1 Notification Procedures:

Any person who discovers an ammonia release must immediately notify the person(s) listed below:

- Day Shift

  Any person who discovers an ammonia release during the day shall call:

Personnel	Work Number
Tom Colby	(518) 523-4436
Faye Gonyea	(518 523-4436
Mike Gonyea	(518) 523-4437

- Night Shift, Weekends, Holidays

  Any person who discovers an ammonia release during these periods shall immediately call one of the persons listed below:

Personnel	Home Number
Tom Colby	(518) 523-7507
Warren Ford	(518) 873-6693
Faye Gonyea	(518) 576-4737

The caller should provide the following information where applicable (See Release Incident Form, Figure 1):

1. Caller's name
2. Type and extent of release
3. Location of release
4. Release control measures in effect

FIGURE 1

SPILL INCIDENT FORM

Use this form to record any spills at the facility:

Date: _____ Time: _____ Reported By: _____

Location of Spill: _____

_____

Fluid Type: _____ Volume (Gallons): _____

Weather Conditions (Sunny, Rain, Snow, Wind Direction, Temperature, etc.):

_____

Watercourse Affected: _____

Control Measures Taken: _____

_____

_____

Personnel Involved: _____

Injuries: _____

Estimated Property Damage and Cost of Cleanup: _____

_____

Disposal of Contaminated Materials: _____

Cause of Spill: _____

_____

Action(s) Taken to Prevent Recurrence: _____

_____

5. Number and condition of injured, if any

6. Time the release occurred

7. Return telephone number

Only management personnel shall notify the appropriate state and/or federal authorities and shall complete the Regulatory Agency Reporting Log, Figure 2.

- Regulatory Agencies: Mandatory within two (2) hours after a spill

NYS Dept. of Environmental Conservation Hotline	1-800-457-7362
NYS Dept. of Environmental Conservation, Region 5	(518) 891-1370

Note: The NYS Dept. of Environmental Conservation Hotline must also be notified in the event of a suspected or probable release of ammonia, unless an investigation shows that a release has not occurred, as per NYS regulations 6 NYCRR Part 595.

- Other Regulatory Agencies (if required):

US Coast Guard National Response Center (NRC)	1-800-424-8802

Note: The NRC is required to be notified no later than 24 hours if a release of 100 pounds (approximately 14 gallons) or greater of ammonia occurs as per federal regulations 40 CFR Part 302.

EPA - Oil & Hazardous Chemical Spills and Radiation Leaks	(201) 548-8730
NYS Dept. of Transportation	(518) 457-6164

- Local Agencies (if required):

North Elba Volunteer Fire Department	(518) 523-2535
Village of Lake Placid Police Department	(518) 523-2306
Emergency Broadcast System	(518) [illegible]941

1.2 Response Procedures:

Response operations shall follow a sequence that is initiated with notification of an emergency and continue through preparation of equipment and personnel for the next potential emergency.

In the event of a major release, ORDA employees will not respond in order to contain or stop the release at its source. The function of ORDA employees during a major release is to notify proper authorities (as given in Section 1.1 of this Part) and to aid in the evacuation of all non-essential personnel from

FIGURE 2

REGULATORY AGENCY REPORTING LOG

A. Name of Personnel Making Phone or Personal Contact: _____

_____

B. Date and Time of Conversation: _____

C. Name of Agency, Person Contacted and Title: _____

_____

D. Location of Agency: _____

E. Nature of Incident Reported: _____

_____

_____

F. Verbal Commitments (if any) Made: _____

_____

_____

G. Demands Requested by Agency: _____

_____

_____

H. Verbal Commitments (if any) Made by Agency: _____

_____

_____

the incident area (refer also to Section 5.1 of this Part for further discussion of personnel roles). A major release is defined as an incident which results, or is likely to result, in an uncontrolled release of ammonia, which cannot be absorbed, neutralized, or otherwise controlled at the time of release by ORDA employees. In terms of state and federal regulations, a major (reportable) release of ammonia is a release of 100 pounds (14 gallons) or more. Examples of major releases include tank/pipeline failure. The New York State Department of Environmental Conservation (NYSDEC) Region 5 (Raybrook) Spill Response Unit will assume control of a major release incident upon arrival at the incident area. ORDA employees will fully cooperate with the NYSDEC and all other authorities.

In the event of a minor release (a release not defined as being major), appropriately trained ORDA employees (see Section 5.2 of this Part) will respond in order to contain or stop the release at its source. These persons shall also notify proper authorities (as given in Section 1.1 of this Part) and aid in the evacuation of all non-essential personnel from the incident area (refer to Section 5.1 of this Part for further discussion of personnel roles). These persons shall ensure that personal protective equipment is utilized during responses to releases. Examples of minor releases include releases resulting from maintenance operations (i.e., changing gaskets, valves, etc.), operational wear of equipment (i.e., gaskets, valves), and operating losses (i.e., fugitive emissions).

2.0 EMERGENCY AND FIRST-AID INFORMATION:

Refer to the Material Safety Data Sheet (MSDS) for ammonia included in Appendix 1.

For the Mt. Van Hoevenberg facility, ammonia is used as a refrigerant. As such, it is stored as a compressed liquid. Contact with liquid ammonia can severely burn the eyes and skin, with excessive burns potentially being fatal. Liquid ammonia, when released to the environment, forms a clear colorless gas with a characteristic pungent ammonia odor. Ammonia gas can be suffocating and extremely irritating to the eyes, throat, and respiratory tract. Effects of exposure range from mild irritation to severe corrosion of body tissue depending on exposure level and duration of exposure. Intense exposure (ammonia concentrations of 2,500 to 4,500 parts per million for 30 minutes) can be fatal. Elevated concentrations of ammonia gas can burn and blister skin and cause severe eye irritation resulting in permanent corneal damage.

Ammonia is classified as a nonflammable gas; however, it will burn if vapor concentrations range between 15% to 28%. Its potential as a fire hazard will increase in the presence of oil or other combustible materials; however, combustibility is not usually a common problem in the event of leakage.

Ammonia is soluble in water forming a corrosive liquid. Ammonia vapors are lighter than air, therefore, they rise; however, the vapors from a leak will initially hug the ground. Ammonia reacts vigorously with chlorine, chlorine bleach, scouring powers, bromine, iodine, chlorates, and hypochlorites, releasing heat and poisonous gases. Ammonia may form explosive compounds with mercury, gold, and silver. Moist ammonia corrodes copper, tin, zinc, and many alloys. Spill response equipment must be compatible with ammonia.

Specific emergency and first aid procedures are outlined below:

First aid for exposure to ammonia is described for each route of exposure as follows:

Inhalation: Move the victim to fresh air. Give oxygen or artificial respiration, if necessary. Keep the victim warm. Seek medical attention immediately.

Skin: Get to an ammonia free area. Flush the skin and ammonia soaked clothing immediately with large quantities of water for at least 15 minutes. Remove any frozen clothing only after allowing to thaw. No salves or ointments should be applied for 24 hours. Seek medical attention immediately.

Eyes: Immediately flush with large amounts of water for at least 15 minutes, holding eyelids out and open to wash entire surface. Seek medical attention immediately.

Ingestion: Drink large amounts of water only if conscious. DO NOT INDUCE VOMITING. If vomiting begins, place head lower than hips. Seek medical attention immediately.

Note to Physician: Severe exposure may require supportive measures for pulmonary edema.

Minor first aid shall be performed by appropriately trained and certified emergency response personnel. The Lake Placid Volunteer Ambulance Service and Emergency Medical Service (EMS) program shall also be utilized to provide emergency medical care for ORDA emergency response personnel, support personnel, and the general public. These services shall monitor personnel engaged in control, mitigation, and

support functions in the event of an ammonia release. At all times they will utilize adequate level of Personal Protective Equipment (PPE) for their own safety.

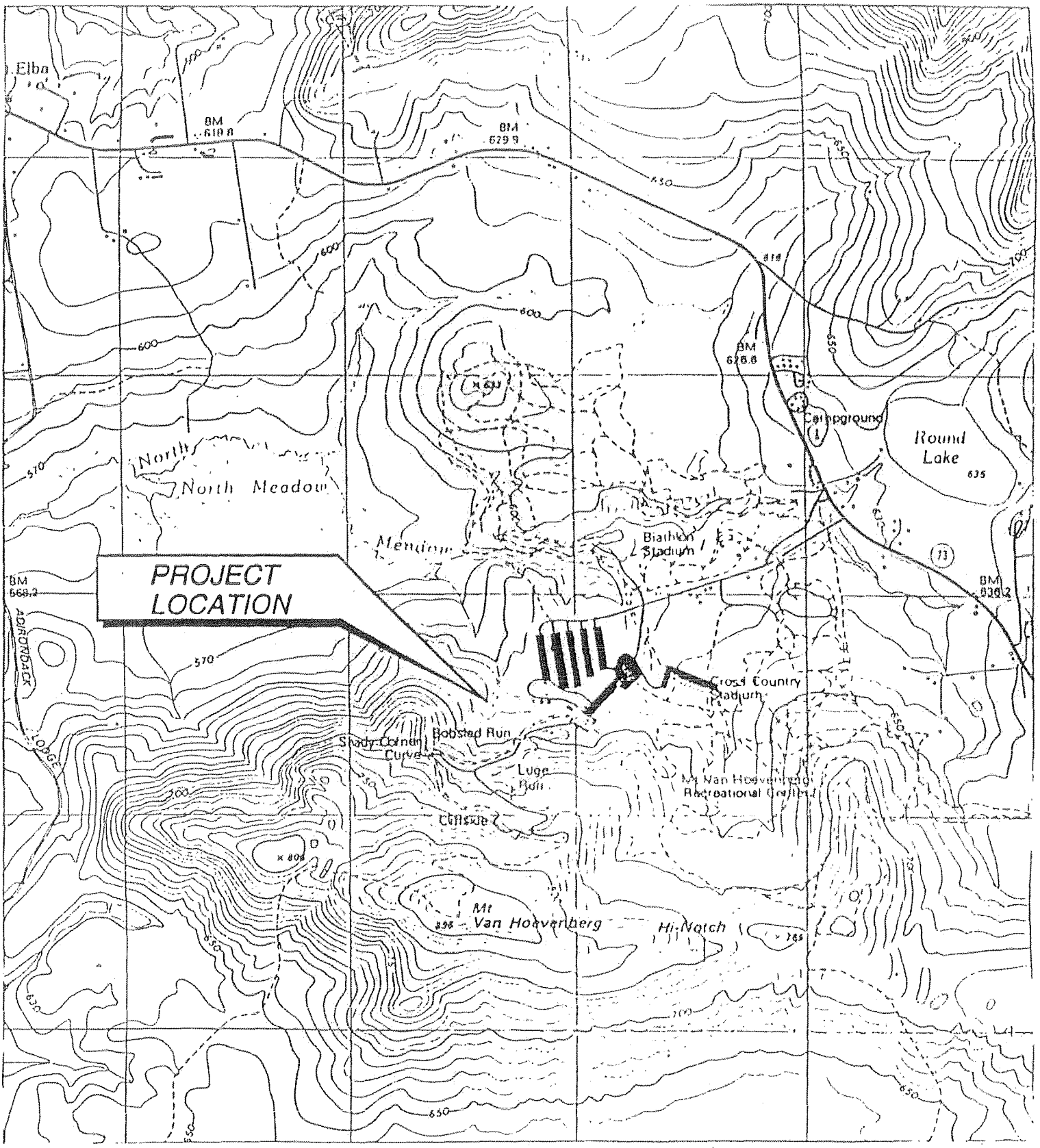
3.0 FACILITY DESCRIPTION:

The Mt. Van Hoevenberg Recreational Area, operated by ORDA, is located on the west side of Route 73 in Lake Placid, New York (Figure 3). The Recreational Area includes a luge track, a bobsled track, an administration building, a restaurant, a refrigeration pumphouse, a maintenance garage, and an employee lounge/sled shed. A Site Plan for the Recreational Area is presented in Appendix 2. The Recreational Area is open to visitors all year. During the winter season, the luge and bobsled tracks are in operation (iced), and the Recreational Area is manned 24 hours per day, seven days a week. During the non-winter season, the Area is open to visitors; however, the luge and bobsled tracks are not iced and the Recreational Area is manned daily 8:00 a.m. to 4:30 p.m. Access to the Recreational Area is secured with a chain link fence and gate. The gate is manned 24 hours per day.

The ammonia used to ice the tracks is stored as a liquid in the ammonia pumphouse in four aboveground storage tanks. Two of the tanks, 9,000 gallons each, service the luge run; two of the tanks, 12,000 gallons each, service the bobsled run. The ammonia is pumped to the luge and bobsled tracks when the tracks are in operation through filler mains. Ammonia is returned to the pumphouse via gravity through suction returns. The filler and suction mains for the luge run are underground from the pumphouse to the base of the luge run and then aboveground for the length of the track. The mains are located directly under the track. The filler and suction mains for the bobsled run are entirely underground. The process is a closed loop with ammonia being recirculated. Pumps and compressors are also located in the pumphouse. Two cooling towers are located outdoors adjacent to the pumphouse and are in operation when the tracks are in operation.

4.0 PRE-EMERGENCY PLANNING AND COORDINATION WITH OUTSIDE PARTIES:

Planning is essential in order to respond to emergencies effectively. Personnel must be ready to quickly respond.



SOURCE: USGS 7.5 Minute Series - 1979
QUADRANGLE: Keene Valley, New York

SCALE: 1:25,000

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS, SURVEYORS & PLANNERS

Olympic Regional Development Authority
Mt. Van Hoevenberg Recreational Area
Lake Placid, New York
Site Location Map

FIGURE NO.	DATE:	BY:	CHK:
3	10/92	JKM	SED

The pumphouse, including the cooling towers , and the luge run are recognized as the areas most likely to be involved in a potential ammonia-release incident, and the areas which could result in a health concern in the event of a release.

Coordination with outside parties and agencies may be required for effective response to emergencies. The following parties have been notified, given a copy of, or made aware of the existence and contents of, as well as their involvement under this Plan:

ORDA Mt. Van Hoevenberg employees
Village of Lake Placid Police and Fire Departments
Area hospital, ambulance, and rescue services
Regional New York State Police
New York State Department of Environmental Conservation, Region 5, Raybrook
Bureau of Toxic Substance Assessment, Empire State Plaza, Albany

The above mentioned parties shall coordinate their actions when responding to an emergency in accordance with the procedures described in this Plan. Training on the contents and procedures covered in this Plan is provided to appropriate ORDA personnel as described in Section 5.2 of this Part.

5.0 PERSONNEL ROLES, LINES OF AUTHORITY, TRAINING:

5.1 Personnel Roles and Lines of Authority:

In the event of an incident which results, or is likely to result, in an uncontrolled release of ammonia (a major incident), ORDA employees will not respond to contain or stop the release at the source. In the event of a major incident, it is the function of ORDA employees to ensure the safe evacuation of visitors and non-essential personnel, to notify proper authorities, and to assist authorities where necessary. Specifically, in the event of a major incident, the General Manager or his/her designee, shall assume control of the incident. This person shall assign a team of trained ORDA employees to assist him or her, limiting the number of persons to only those necessary. The General Manager, or designee, shall direct the evacuation of all non-essential personnel and notify appropriate authorities as defined in Section 1.1 of this Part. The General Manager, or designee, shall ensure that ORDA employees do not attempt to contain or stop the release at the source during a major incident and shall ensure cooperation with authorities involved in containing or stopping the release. Only employees appropriately trained as described in Section 5.2 of this Part shall be allowed to remain on-site

during a major incident. Those employees likely to discover a release or potential release shall be trained as described in Section 5.2 of this Part.

In the event of an incident which is not likely to result in an uncontrolled release of ammonia (a minor incident), appropriately trained ORDA employees will respond in order to stop the release. These persons shall evacuate all non-essential persons from the area of the incident and ensure the proper use of PPE when required.

A Release Incident Form (Figure 1) and Regulatory Agency Reporting Log, when required (Figure 2), shall be completed by the General Manager or his/her designee as soon as practical after an incident (major or minor).

5.2 Training:

ORDA employees who may participate in ammonia release incidents and who are likely to discover a release or potential release shall be trained prior to participating in actual incident response and shall receive annual refresher training. Training shall include, at a minimum, knowledge of the contents of this Plan, hazards associated with ammonia (i.e., health, fire) and potential outcomes associated with an incident created when ammonia is released. Training shall also include how to recognize a release or potential release, appropriate notification procedures, and each employee's role during an incident. The use, selection, and care of PPE will also be included during training. Training shall be conducted by qualified personnel.

6.0 EMERGENCY RECOGNITION:

6.1 Recognition of Ammonia Releases:

Rapid recognition of potential ammonia releases can avert an emergency. On a day-to-day basis, personnel shall be constantly alert for indicators of potentially hazardous situations. Recognition will focus in determining whether a hazard exists, its potential, and precautions to take for safe operations during an incident. For the Recreational Area, an ammonia release incident can be recognized by olfactory observation, visual observation, a change in the operating conditions of the pumps located in the pumphouse, and use of air monitoring instruments (i.e., portable meters, mounted detection sensors).

Ammonia, in its natural state, is a clear colorless gas with a characteristic odor. Ammonia has a low odor threshold (17 parts per million); the odor threshold is essentially the lowest concentration of ammonia that can be readily detected by olfactory observation. Additionally, the strength of the odor is proportional to the concentration of ammonia present. As such, a pungent ammonia odor may be indicative of a release and the magnitude of a release; however, due to the low odor threshold of ammonia, visual observation, pressure reading of the pumps, or air monitoring instruments will be used in conjunction with olfactory observation to confirm the location and magnitude of a release.

The vapor evolved when liquid ammonia is released into the atmosphere can be visible at the point of release. As such, a visible vapor stream emanating from a pipeline, tank, or associated equipment may be indicative of a release. The volume and size of the stream may also be proportional to the magnitude of the release (i.e., a pinpoint release versus a fracture).

The refrigeration system for the bobsled and luge runs uses ammonia in a closed-loop system. The pumps responsible for transferring liquid ammonia to the tracks operate within a specified pressure range of 220 to 250 pounds per square inch (psi). Pressure readings below 220 psi may be indicative of a leak. The pumps are equipped with an automatic shut-off which is activated when the pumps operate outside this range. The pumps can also be manually shut-off. Pumphouse operators are required to record the pressure readings on a hourly basis. A change in pressure reading can be used to determine the magnitude of a release; a pressure change which results in the pumps automatically shutting down could mean a major leak has occurred within the system. Visual and olfactory observation may be used in conjunction with the pressure change to locate the source of the release. Caution must be used during any investigation, especially when entering any enclosed areas.

Portable air monitoring meters and ammonia detection sensors may be used to detect the concentration of ammonia in a specified area. A high concentration of ammonia may be indicative of a release.

6.2 Potential for Ammonia Releases:

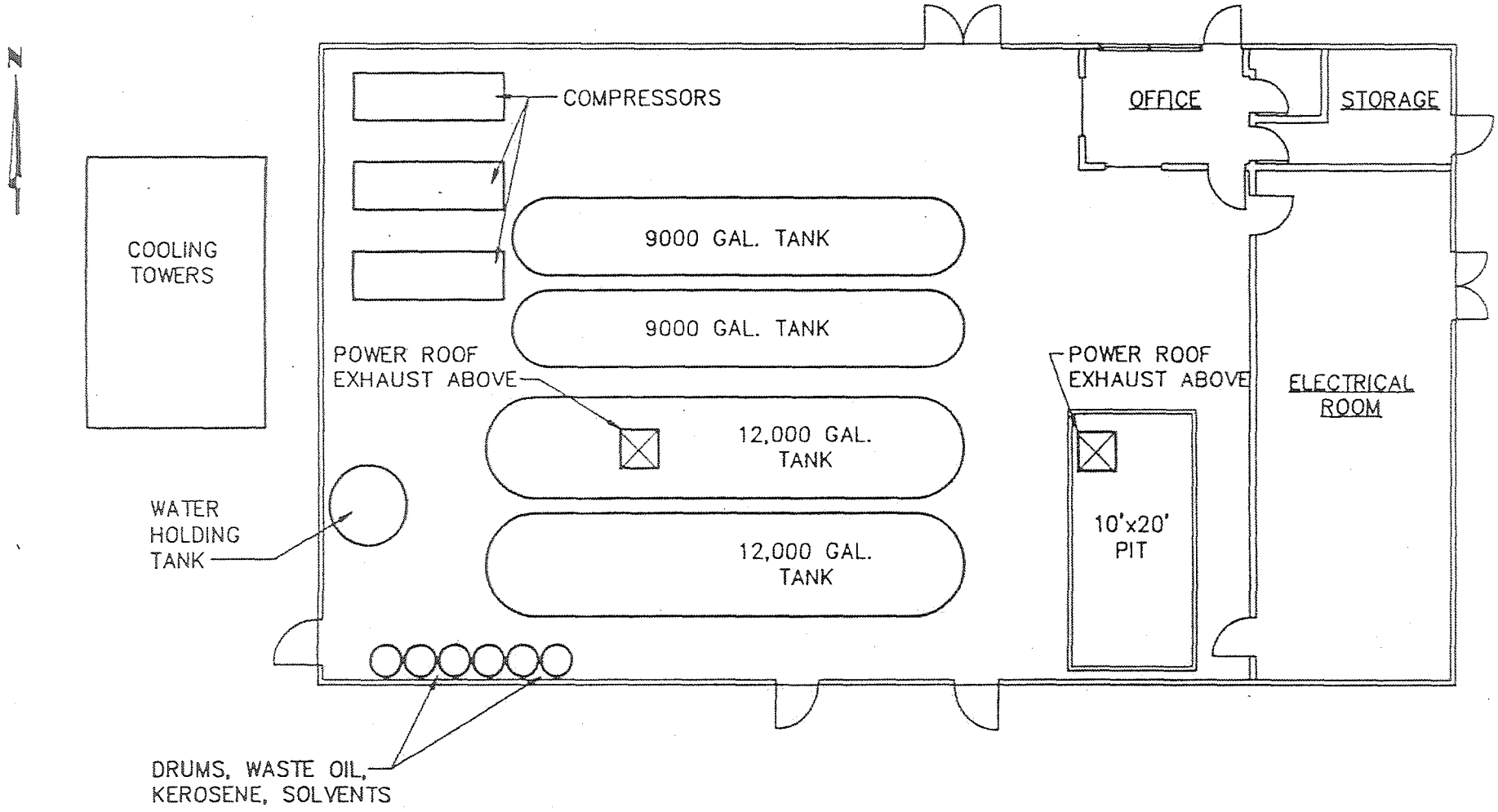
The luge run is approximately 2,950 feet in length. Ammonia is pumped from the pumphouse to the luge run through underground piping, and then through aboveground piping for the length of the track. The aboveground piping is situated directly under the luge track and consists of a 4-inch filler pipe

and a 10-inch suction return (ammonia mains). The track is separated into 56 sections. Each section contains its own grid which is isolated from the other sections by a suction header, and which connects to the ammonia mains. The ammonia mains and suction headers have the potential for a release of ammonia.

The bobsled run is approximately 4,600 feet in length. Ammonia is pumped from the pumphouse via underground piping to and along the length of the track. The piping consists of a 4-inch filler pipe and 8-inch suction return (ammonia mains). The track is separated into 66 sections. Each section contains its own grid which is isolated from the other sections by a suction return situated in an individual manhole and which connects to the ammonia mains. Ammonia is pumped through the grids as part of the freezing process. The ammonia mains and suction returns have the potential for a release of ammonia.

The pumphouse is located at the base of the tracks, and is comprised of a single building measuring 92 feet by 50 feet. The pumphouse contains an entrance-way, an electrical room, and an ammonia storage area. Figure 4 illustrates the layout of the pumphouse. The ammonia storage area encompasses most of the building and measures approximately 77 feet by 50 feet. The storage area contains four aboveground ammonia storage tanks with associated piping, three compressors with associated piping, three pumps with associated piping, one aboveground water storage tank with associated piping, and several 55 gallon drums used for storage of kerosene, cleaning solvents, and waste oil. The ammonia storage tanks are situated approximately in the center of the area. The pumps are situated adjacent to, and west of, the tanks. The compressors are situated in the northwest corner of the area. The water storage tank is situated in the southwest corner of the area. The 55 gallon drums are predominantly situated along the southern wall in the southwest portion of the area. Two cooling towers are located outdoors adjacent to and in the west side of the pumphouse. Associated pipelines run between the cooling towers and the pumphouse.

Releases of ammonia may occur as a result of maintenance operations (i.e., changing pumps, valves, gaskets), operational wear (i.e., failing gasket), equipment failure (i.e., tank failure, pipeline fracture), and ammonia transfer operations (i.e., loading the ammonia storage tanks).



NOT TO SCALE

CHA
CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS, SURVEYORS & PLANNERS
III WINNERS CIRCLE ALBANY, NEW YORK, 12205

DWG. NO. FIGURE 4 | DATE OCT. 1992

OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
AMMONIA SPILL CONTAINMENT

PUMPHOUSE PLAN

7.0 SAFE DISTANCES, PLACES OF REFUGE, AND EVACUATION ROUTES AND PROCEDURES:

7.1 Safe Distances:

Safe distances shall be determined by the General Manager or his/her designee at the time of an emergency for the safety of emergency response personnel as well as the general population, based on a combination of site and incident specific factors. Factors that shall influence safe distances shall include quantity released, rate of release, method of release, wind direction and speed, atmospheric stability, height of the release, air temperature, and local topography. The U.S. Department of Transportation handbook on emergency response indicates the following evacuation distances for various volume releases:

- For a major release, immediately isolate the release area for at least 300 feet in all directions, then protect those persons in the downwind direction for at least one mile.
- For a minor release, immediately isolate the release area for at least 150 feet in all directions, then protect those persons in the downwind direction for at least 0.2 mile.

7.2 Places of Refuge:

On-site refuge areas may be set up for localized emergencies that do not require evacuation. These refuge areas shall only be used for essential needs, such as short rest breaks, emergency response strategy meetings, or temporary relief. The refuge shall be located upwind of the incident.

Other refuges may be set up upwind of the incident, or in the case of evacuation, off-site at the safe distance destination. These shall provide for emergency needs such as first aid, emergency response supplies, water, and communication system.

7.3 In-Place Sheltering and Evacuation:

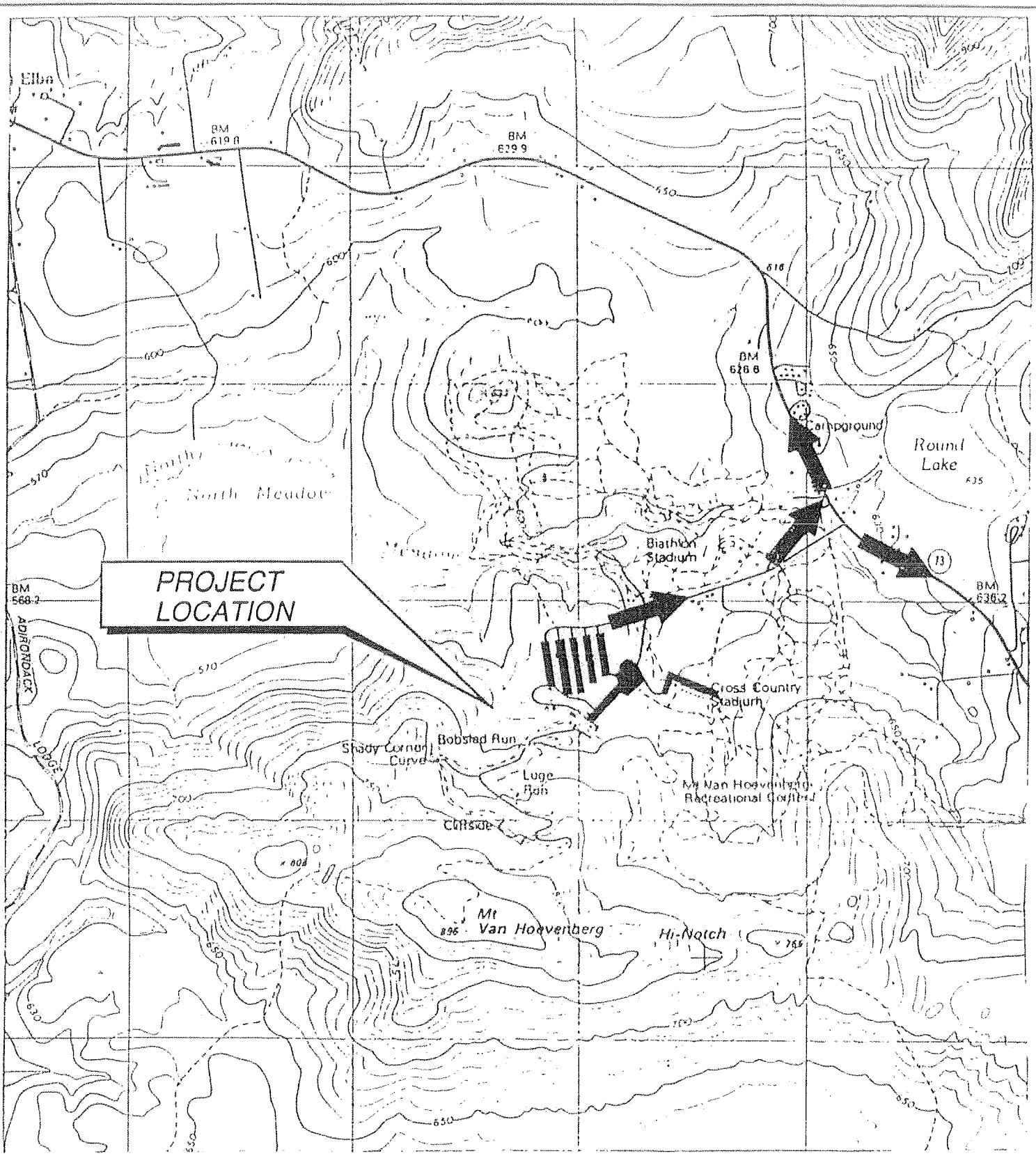
If in-place sheltering or evacuation of the general populace is determined to be necessary, notifications shall be made by door-to-door notification, messages over a public address system on emergency vehicles, or over the Emergency Broadcast System depending on available emergency personnel, and the amount of time available for notifications. Instructions for in-place sheltering shall include the need to seal doors, windows, and other exterior openings, shut down fresh air ventilation equipment, and information on where to receive further instructions and current news regarding the emergency including re-entry orders.

If a full-scale evacuation is required, centers capable of accommodating large numbers of people for an extended period shall be procured. Various buildings within the Village of Lake Placid may be utilized, including the Lake Placid Firehouse, area churches, Lake Placid Elementary School, Lake Placid Central School, Lake Placid Town Hall, and the U.S. Olympic Training Center. In addition, buildings outside the Fire District and/or the services of the American Red Cross may be utilized.

7.4 Evacuation Routes and Procedures:

Evacuation routes for victims and endangered personnel in the vicinity of the incident shall be established and marked. The routes shall be directed from the incident area through an upwind route to an off-site location in the event conditions necessitate a general site evacuation. A wind sock or flag may be used as a general indicator of wind direction.

If it is necessary to evacuate the general populace, notification shall be made by door-to-door notification, messages over a public address system on emergency vehicles, or over the Emergency Broadcast System. A long continuous siren originating from the fire department shall also be used to indicate an emergency. Evacuation routes will generally follow the New York State Route 73 transportation corridor. Figure 5 illustrates these routes in addition to subsidiary routes with respect to the Recreational Area.



SOURCE: USGS 7.5 Minute Series - 1979
QUADRANGLE: Keene Valley, New York

SCALE: 1:25,000

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS, SURVEYORS & PLANNERS

Olympic Regional Development Authority
Mt. Van Hoevenberg Recreational Area
Lake Placid, New York
EVACUATION ROUTES

FIGURE NO.	DATE:	BY:	CHK:
5	10/92	JKM	SED

8.0 CRITIQUE OF RESPONSE AND FOLLOW-UP:

A critique of all major incidents will be held as soon as practicable after termination of the incident. Discussion will focus on how well pre-incident plans worked, how the incident itself was handled, and what areas need improvement or change. The response of emergency and support personnel, the performance of equipment used, and all other aspects of the incident shall be evaluated.

The General Manager, or designee, shall initiate the investigation and documentation of the incident. Documentation of each incident shall include, at a minimum, chronological history of the incident, facts about the incident and when they became available, title and names of personnel and teams, actions taken, the effectiveness of the actions taken, types of samples collected and test results, possible exposures of personnel, and history of all injuries or illnesses during, or as a result of, the incident.

9.0 PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY EQUIPMENT:

Equipment shall be provided to enable the rescue and treatment of victims, to protect response personnel, and to mitigate hazardous conditions. Chemical protective clothing will be worn to prevent harmful ammonia vapors or liquid from coming into contact with the skin or eyes. Used with engineering controls and respiratory protection, properly selected chemical-resistant clothing can protect personnel.

Four levels of PPE are used. Level A provides the highest level of respiratory (supplied air), skin, and eye protection. Level B provides the highest level of respiratory protection (supplied air), but a lesser level of skin protection. level C provides air-purifying respiratory protection together with skin protection. Level D provides no respiratory protection and only minimal skin protection. The type of equipment required for each level is provided in Table 1. The level of equipment required is dependent on the nature of the incident and the potential hazards involved, and shall be determined prior to entering the incident area. Entry into the incident area will be denied to anyone not having the proper level of protection.

No person shall be allowed to wear any personal protective equipment for which he or she has not been fully trained on the use of, and for which he or she has not been medically approved to wear.

TABLE 1

HAZARD LEVEL VS. EQUIPMENT

	Level of Protection			
	A	B	C	D
Hard hat	X	X	X	X
Face shield/safety glasses			X	X
Boots	X	X	X	X
Inner gloves	X	X	X	
Outer gloves	X	X	X	
Work coveralls				X
Chemical-resistant coveralls			X	
Chemical-resistant suit		X		
Fully-encapsulating suit	X			
Air-purifying respirator			X	
SCBA/air-line respirator	X	X		
Two-way radio	X			

PART II: SPILL PREVENTION, CONTROL, AND COUNTERMEASURES

1.0 FACILITY SPILL HISTORY:

There have been no major releases or spills of ammonia. Minor releases have occurred as a result of facility maintenance operations (i.e., changing pumps, valves, gaskets), operational wear (i.e., failing gasket), and operating losses (i.e., fugitive emissions). Approximately 1,000 gallons total of ammonia is required to be added to the four ammonia storage tanks every two to three years to make up for lost product.

2.0 DESCRIPTION OF PREVENTATIVE PROCEDURES AND CONTAINMENT STRUCTURES:

2.1 Source by Source Description:

The following is a list of possible ammonia release points and ammonia release prevention methods for each ammonia storage tank.

Each section below presents the following for each tank:

- potentials for release,
- procedures and equipment in place to prevent a release,
- containment structures in place to contain a release.

2.1.1 Two-12,000 Gallon and Two-9,000 Gallon Aboveground Ammonia Storage Tanks:

Two-12,000 gallon and two-9,000 gallon aboveground ammonia storage tanks and associated piping are located in the pumphouse situated at the base of the bobsled and luge runs. The ammonia is used as a refrigerant during the icing of the tracks.

A. Release Potential: Transfer points from the bulk carrier to the storage tanks.

Prevention:

(1) Follow ammonia transfer procedures located in Section 3.1 of this Part.

(2) Each tank is equipped with a liquid eye-level gauge and a high/low level alarm which is sounded in the pumphouse.

(3) The tanks are contained and secured within the pumphouse. The Recreational Area is manned 24 hours

per day by a security guard; therefore, the possibility of a release due to vandalism or unauthorized access is minimal. Guard on duty 24 hrs/day Oct-Mar, and on until 9 p.m. April-Sept.

Containment: A release is controlled through emergency procedures described in Part I of this Plan.

B. Release Potential: Tank failure.

Prevention: The tanks are situated aboveground to allow monitoring for leaks, and are visually examined according to Section 2.2 of this Part.

Containment: The tanks are located inside the pumphouse. A release would be contained within the pumphouse for further handling. Should a release inside the pumphouse occur, ammonia concentrations could be deadly and appropriate air supplied respirators should be worn during emergency response.

C. Release Potential: Aboveground piping damage.

Prevention: Damage to transfer piping is prevented by limiting operations within the area. Piping supports are periodically inspected for leaks and maintenance deficiencies.

Containment: Piping is located inside the pumphouse. Releases from exterior, aboveground piping is controlled through emergency procedures described in Part 1 of this Plan.

D. Release Potential: Underground piping damage.

Prevention: Piping is located underground (as is the case for the bobsled run); therefore, damage caused by facility operations is unlikely.

Containment: There is no containment per se. It is expected that a release would be readily detected by a pressure change in the pumps located in the pumphouse or by olfactory observation of released ammonia emanating from soil surrounding the pipelines or from water drawn from downgradient groundwater wells.

2.2 Inspection and Monitoring:

ORDA employees will inspect the facility including the aboveground storage tanks and associated equipment, aboveground piping, valves, gauges, vents, and leak detection equipment for leaks.

The following will be performed on a monthly basis:

- Inspecting exterior surfaces of tanks, pipes, valves, dikes and associated equipment for leaks and maintenance deficiencies.
- Identifying cracks, areas of wear, corrosion and thinning, poor maintenance and operating practices, excessive settlement of structures, malfunctioning equipment, and other structural and foundation weaknesses.
- Inspecting and monitoring all leak detection equipment, spill/overfill prevention valves and warning systems, and interstitial spaces.

Any problems or discrepancies shall be immediately reported to the Pumphouse Supervisor for corrective action.

Pumphouse personnel will monitor and record the pressure reading for each pump on a hourly basis for each work day. During non-work days, the security guard will inspect and record the pumphouse and the pressure gauges periodically. If pressure readings indicate a release may have occurred and if aboveground piping and equipment indicate no obvious leak, the underground piping system shall be carefully inspected.

3.0 TRANSFER OPERATIONS:

The spill contingency plan for the transfer of ammonia into or from the Area's ammonia storage tanks is designed to prevent accidental release of ammonia and is discussed below.

3.1 Two-12,000 Gallon and Two-9,000 Gallon Aboveground Ammonia Storage Tanks:

Prior to commencing any off-loading operations, the driver of the truck must receive permission to unload from the pumphouse supervisor. Operating personnel are also on hand to inspect the off-loading operation. Drains, outlets, and all connections on the tank trucks are checked for leakage before unloading and departure. In addition, a pumphouse employee shall examine the liquid eye-level gauge to determine the amount of product which can be accepted, and compare this amount with the amount being delivered.

The pumphouse employee shall inspect the hook-up procedure of the bulk carrier truck as a precaution of overfilling and possible early release from the hook-up. In addition, the pumphouse employee shall be present at the time the bulk carrier truck disengages from the transfer and shall inspect the disengagement procedure to be sure all valves and caps are tightly closed and sealed.

APPENDIX 1

MATERIAL SAFETY DATA SHEET FOR AMMONIA

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 1
Anhydrous Ammonia

Issued: 8/85 Revision: D, 4/90

Section 1. Material Identification

Anhydrous Ammonia Description: Manufactured primarily by using atmospheric nitrogen and a hydrogen source at high temperatures (752 °F/400 °C to 11,732 °F/6500 °C) and pressures (100 to 900 atm) in the presence of an iron catalyst (a modified Haber reduction process). Used as a refrigerant, a fertilizer, a cleaning and bleaching agent, a household cleaner, a condensation catalyst, a neutralizing agent in the petroleum industry, and a yeast nutrient; in nitriding of steel, developing diazo films, manufacturing nitric acid, synthetic fibers, and explosives; and in latex preservatives, dyeing, ureaformaldehyde, nitrocellulose, nitroparaffins, melamine, ethylenediamine, fuel cells, sulfite cooking liquors, and rocket fuel.
Other Designations: CAS No. 7664-41-7; NH_3; ammonia (ACGIH); ammonia anhydrous.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(TM) for a suppliers list.

NFPA

Gaseous

Liquified

R	1
I	3
S	4
K	-

HMIS

H	3
F	0
R	0

PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Anhydrous ammonia, ca 100%

OSHA PEL
15-min STEL: 35 ppm, 27 mg/m³

ACGIH TLVs, 1989-90
TLV-TWA: 25 ppm, 17 mg/m³
TLV-STEL: 35 ppm, 24 mg/m³

NIOSH REL, 1987
50 ppm
5-min ceiling: 35 mg/m³

Toxicity Data*
Human, eye: 700 ppm
Human, inhalation: 20 ppm inhaled affects the sense organs, special senses (conjunctiva irritation, ulcerated nasal septum), and the lungs, thorax, and respiration (change in trachea or bronchi)

* See NIOSH, *RTECS* (BO0875000), for additional irritative, mutative, and toxicity data.

Section 3. Physical Data

Boiling Point: -28.03 °F/-33.35 °C
Melting Point: -107.9 °F/-77.7 °C
Vapor Pressure: 10 atm at 78.3 °F/25.7 °C
Vapor Density (Air = 1): 0.6
Molecular Weight: 17.03 g/mol
Specific Gravity (H_2O = 1 at 39 °F/4 °C): 0.77 at 32 °F/0 °C (liquid), 0.7 at -27 °F/-33 °C (gas)
Water Solubility: 47% at 32 °F/0 °C, 34% at 68 °F/20 °C

Appearance and Odor: Colorless liquid or gas with a strong, pungent, and irritating odor. Their low and high odor thresholds are 0.0266 mg/m³ and 39.6000 mg/m³, respectively.

Section 4. Fire and Explosion Data

Flash Point: Gas at room temperature	Autoignition Temperature: 1204 °F/ 651 °C (iron catalyzed)*	LEL: 16% v/v	UEL: 25% v/v

Extinguishing Media: An explosive mixture may form in air if this gas continues to flow while the flame is extinguished. Thus the best procedure is first to stop the flow of gas. It may be necessary to use carbon dioxide or dry chemical to extinguish the flame surrounding the valve that controls the gas supply. Use water to cool fire-exposed containers and to protect personnel shutting off gas. The water reduces gas concentration due to its solubility in water. For fires involving liquified anhydrous ammonia, use dry chemical or CO_2.
Unusual Fire or Explosion Hazards: This material is a moderate fire and explosion hazard when exposed to heat and/or flame. The presence of oil and other combustible materials increases the fire hazard.
Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode. If gas is leaking or tanks are exposed to intense heat, evacuate the area and the area downwind. Tanks should be equipped with appropriate pressure-relief devices. Violent rupture can occur if relief valves fail. Stay clear of tank heads. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

* 850 °C/1562 °F (uncatalyzed).

Section 5. Reactivity Data

Stability/Polymerization: Anhydrous ammonia is stable at room temperature in closed containers under normal storage and handling conditions. Its decomposition to flammable hydrogen and nitrogen gas begins above 840 °F/450 °C. Hazardous polymerization cannot occur.
Chemical Incompatibilities: This material is an alkaline gas that gives off heat when it reacts with acids. Contact with interhalogens, boron halides, 1,2-dichloroethane (with liquid NH_3), ethylene oxide (polymerization reaction), chloroformamidnium nitrate, oxygen + platinum, magnesium perchlorate, nitrogen trichloride, and strong oxidants can cause potentially violent or explosive reactions. Contact with heavy metals and their compounds, chlorine azide, bromine, iodine, iodine + potassium, tellurium halides, pentaborane (9), silver oxide, silver chloride, silver nitrate, silver azide, and hypochlorites yield explosive products. Contact with chlorine or chlorine bleach can cause the evolution of hazardous chloramine gas. Ammonia forms sensitive explosive mixtures with air + hydrocarbons, germanium derivatives, stibine, 1-chloro-2,4-dinitrobenzene, ethanol + silver nitrate, and 2-, or 4-chloronitrobenzene (above 160 °C/30 bar). This material is also incompatible with acetaldehyde, acrolein, boron, chlorosilane, hexachloromelamine, sulfur, hydrazine + alkali metals, potassium ferricyanide, potassium mercuric cyanide, nitrogen dioxide, phosphorus pentoxide, and tetramethylammonium amide.
Hazardous Products of Decomposition: Thermal oxidative decomposition of anhydrous ammonia can produce toxic fumes of ammonia (NH_3) and nitrogen oxides (NO_x).

Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists anhydrous ammonia as a carcinogen.
Summary of Risks: Ammonia gas can be suffocating and extremely irritating to the eyes, throat, and respiratory tract. Depending on exposure level and time, effects range from mild irritation to severe corrosion of body tissue due to ammonia's alkalinity. Exposures to increasing concentrations may be hazardous since persons acclimated to its odors may suffer overexposure and adverse health effects. Intense exposure can be fatal. Fatalities may occur from exposure to ammonia concentrations of 2500 to 4500 ppm for 30 min. 700 ppm causes eye irritation. High gas concentrations can burn and blister skin and cause severe eye irritation with permanent corneal damage. Contact with liquid anhydrous ammonia can also severely burn the eyes and skin. Extensive burns can be fatal.
Medical Conditions Aggravated by Long-Term Exposure: Permanent eye damage, scars, and pulmonary impairment.
Target Organs: Respiratory system, eyes.
Primary Entry Routes: Inhalation, ingestion, skin and eye contact.
Acute Effects: Inhalation can cause dyspnea; bronchospasm; mucosal burns of the nose, pharnyx, and larynx (throat irritation at 408 ppm and laryngospasm at 1700 ppm); chest pain; pulmonary edema; saliva secretion; pink, frothy sputum; and urine retention. Ingestion causes nausea, vomiting, and swelling of the lips, mouth, and larynx. Skin contact with concentrated ammonia produces liquefaction necrosis (tissue death) and deep penetrating burns. Eye exposure results in lacrimation, conjunctivitis, iritis, corneal irritation, and temporary or permanent blindness.
Chronic Effects: Chronic bronchiectasis with small airway obliteration may occur. Interstitial fibrosis has been observed after chronic exposure.
FIRST AID
Eyes: Flush immediately, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 min. Time is the most important consideration! *The first 10 seconds are critical to preventing blindness.*
Skin: *Quickly* remove contaminated clothing. After rinsing affected skin with flooding amounts of water, wash it with soap and water.
Inhalation: Remove exposed person to fresh air and support breathing as needed.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, neither induce vomiting nor attempt to neutralize. Have the conscious person drink about 4 oz of water or milk to dilute. Caution! Excessive amounts may cause vomiting.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: Serum ammonia levels are not clinically useful in managing exposures; instead, evaluate clinically for pulmonary edema and respiratory distress, with treatment as appropriate. Consider esophagoscopy if the patient has oral or pharyngeal burns. Do not induce gastric lavage. Steroid treatment is controversial and of questionable benefit. If ingestion is significant, observe for development of esophageal stricture. For eye exposures, irrigate until conjunctival sac pH is <8.5.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice an anhydrous ammonia spill control and countermeasure plan (SCCP).* Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and ventilate area to disperse gas. Cleanup personnel should protect against vapor inhalation and skin contact. Before fixing a leak, use a water spray to reduce the concentration of gaseous ammonia around a leaking vessel. If a cylinder is the source of a leak, remove it to a safe place in open air. Then, either repair the leak or allow the cylinder to empty. If ammonia is liquified, isolate the hazard area and allow it to vaporize. Rapid neutralization of large amounts of ammonia is not advised since the heat generated may increase exposure of personnel. Do not release the water used during cleanup into sewers, drains, or surface water. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 100 lb (45.4 kg) [* per Clean Water Act, Sec. 311(b)(4)]
Listed as a SARA Extremely Hazardous Substance (40 CFR 355), Reportable Quantity: 100 lb; Threshold Planning Quantity (TPQ): 500 lb
Listed as a SARA Toxic Chemical (40 CFR 372.65)
OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.
Warning: Air-purifying respirators do *not* protect workers in oxygen-deficient atmospheres.
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent any skin contact.
Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the OSHA PEL, ACGIH TLVs, and NIOSH REL (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store cylinders or tanks in a cool, well-ventilated, fire-resistant location away from oxidizing agents, combustible materials, incompatible materials (especially chlorine, bromine, iodine, and acids), heat and ignition sources, and exit points. Special outside storage out of direct sunlight is preferred. Protect containers from physical damage. Follow good practice for handling compressed gas in cylinders.
Engineering Controls: Work practices and equipment must be designed to prevent skin and contact with ammonia or ammonia solutions and inhalation of gaseous vapor. Provide workers with training on safe handling. Do not use ammonia near heat and ignition sources. All engineering systems should be of maximum explosion-proof design and electrically grounded and bonded. Cylinders in use should be in enclosed cabinets equipped with an individual air ventilation source to control accidental leaks. Do not use copper, brass, bronze, or galvanized steel in contact with ammonia. Welded, not threaded, joints are preferred in ammonia service. Do not use brazed joints. Iron and steel construction is preferred. Piping should be of rigid steel. Follow OSHA regulations (29 CFR 1910.11).

Transportation Data (49 CFR 172.101, .102)

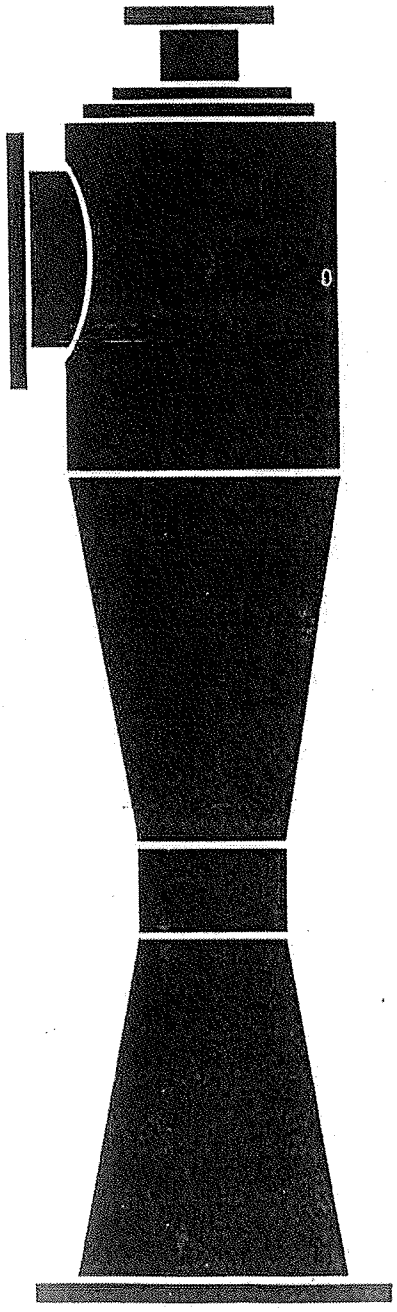
DOT Shipping Name: Ammonia, anhydrous
DOT Hazard Class: Nonflammable gas
ID No.: UN1005
DOT Label: Nonflammable gas
DOT Packaging Requirements: 173.304, 173.314
DOT Packaging Exceptions: 173.306

IMO Shipping Name: Ammonia, anhydrous, liquified, or ammonia solutions, density (specific gravity) less than 0.880 at 15 °C, in water, containing more than 50% ammonia
IMO Hazard Class: 2.3
IMO Label: Poison gas
IMDG Packaging Group: -
ID No.: UN1005

MSDS Collection References: 1, 2-9, 12, 17, 19, 20, 24, 26, 27, 31, 38, 73, 84, 85, 87, 88, 103, 109, 123, 124, 126, 127, 129, 133, 134, 136
Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Hardies, MD M1

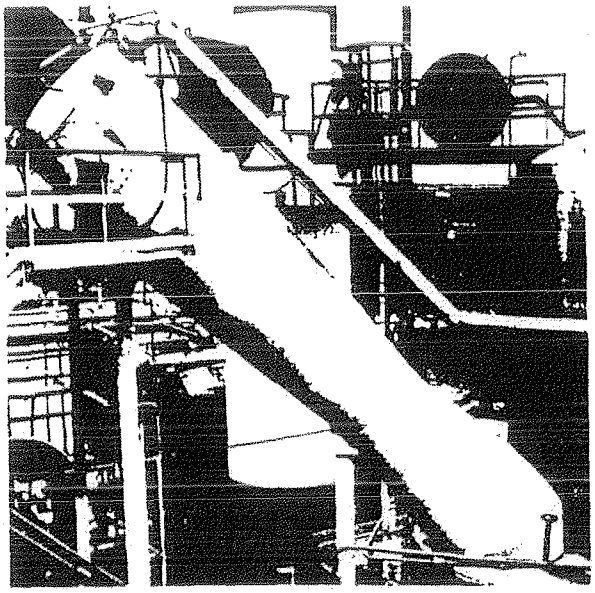
APPENDIX E

LITERATURE ON AIR POLLUTION CONTROL EQUIPMENT



FUME SCRUBBERS

The Croll-Reynolds Jet-Venturi Fume Scrubber is a dependable device designed to entrain and scrub large volumes of gases without the use of complicated baffles or moving parts. Motivating fluid, generally water, leaves the nozzle in a hollow cone spray, creating a draft which draws the gases and vapors into the moving stream where they are continuously scrubbed or absorbed. Subsequent separation is accomplished in units specifically designed by Croll-Reynolds to meet state and federal pollution requirements or to recover valuable product.



The Croll-Reynolds Jet-Venturi Fume Scrubber is one of the most economical answers to the growing problem of air pollution. It is an efficient means for minimizing smoke and undesirable odors, cleaning and purifying air and other gases as well as reclaiming valuable product which may be exhausting to atmosphere. It can also be used as a concentrator by having the motivating fluid absorb the fume for recirculation until a desired concentration is reached. And the Fume Scrubber can do all this with a minimum of maintenance since there are no moving parts and because it operates at low velocities.

EFFICIENCIES ARE HIGH

The efficiency of a Croll-Reynolds Fume Scrubber varies with a variety of factors including temperature, liquid-gas ratio, concentration of contaminants, operating pressures, etc. Here are some typical efficiencies of a single stage ejector Venturi Fume Scrubber which give an idea of the high efficiencies which can be achieved:

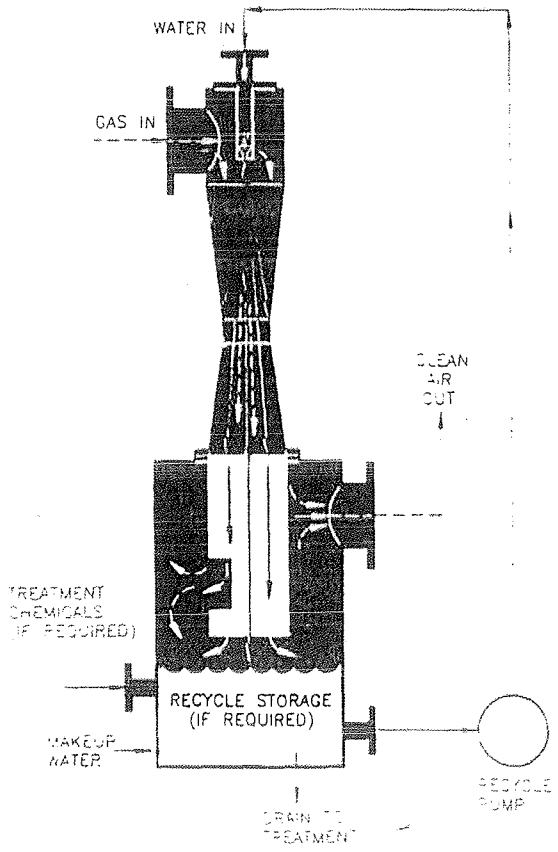
GAS	SCRUBBING MEDIUM	PERCENT REMOVAL PER STAGE
SO_2	Caustic 8-10%	95-98%
HCl	Water at 70°	90-95%
SiF_4	Water	90+%
Ammonia	Water under 75°F	97%
HF	Water	90-95%
HNO_3 Vapor	Water	Up to 95%

The Croll-Reynolds Fume Scrubber is also effective for simultaneously removing dust from the gas stream. With 80 psig water pressure, for example, the efficiency would be better than 99% on all particles over 4 microns in size. An efficiency of over 90% at this pressure could be anticipated for all particles over 2 microns in size. Special jet scrubbers are available for submicron size particles.

SEPARATORS

Fume scrubbing is just part of the job. The scrubbed non-condensibles must be separated from the contaminated liquid as they are discharged into a separator box. The gas can then be passed to atmosphere or to another fume scrubber in series if higher efficiency is required.

Because of the co-current nature of the Jet Venturi Scrubber, it is necessary to provide a method of separating the gas and liquid streams. Small liquid droplets and mist in the gas stream must simultaneously be reduced to meet state and federal pollution requirements. Croll-Reynolds Separators are individually engineered for each application, incorporating the necessary tanks, entrainment separators, recycling equipment, heating or cooling coils and other components.



FUME SCRUBBER

SCRUBBER SIZE	22	33	44	66	88
SIZE FACTOR	.063	0.14	.25	.56	1.00

SCRUBBER SIZE	24x24	30x30	36x36
SIZE FACTOR	9.0	14.1	20.3

FORMULA: if motive pressure is fixed

Required Flow (in GPM)

$$GPM = \frac{(\text{Hydraulic HP})(1714)}{(\text{PSIG})} \times \text{Size Factor}$$

FUME SCRUBBER DESIGN CONSIDERATIONS

Normally all Croll-Reynolds Fume Scrubbers are custom designed for a particular application. By doing this, each Fume Scrubber operates at the optimum efficiency at the design conditions. This would be impossible if each scrubber size were limited to standard dimensions.

Standard units are available, and make sense when conditions are not accurately known. These units are available for quick delivery in all fiberglass reinforced plastic with various capacities. Separator tanks including storage for recycle are also available in these units. For maximum efficiency it is important that the scrubber be carefully sized for the specific application. Here are some of the reasons it is important to let our specialists help you select the Fume Scrubber you need:

1 - Water Pressure. The higher the pressure the more efficient the unit, especially on dust collection. Whenever a recycle system is involved, it is better to specify a water pressure of 80-100 psig at the nozzle since this will normally result in a smaller unit and lower horsepower requirement than a system based on 40-60 psig. Some processes require large quantities of water whereas others can get by on much less. The optimum pressure and liquid consumption will be recommended for your application.

2 - Since the unit requires no fan, the exact amount of draft required should be computed if at all possible. This is a controlling factor in terms of both water volume and pressure.

3 - Systems Components. Croll-Reynolds Jet Venturi Fume Scrubbers are available as individual units for incorporation in your own design or in conjunction with complete package systems designed and engineered by our specialists. Where total design is desired, it is important that we know the requirements for auxiliary equipment such as motors, liquid level controls etc.

4 - Once-through vs. Recirculating. Depending upon the process or pollutant involved, further treatment may be required. A recycle loop will help to concentrate the contaminant to cut the size of further treatment equipment. Recycle can also be used for the recovery of material being scrubbed. For example, a stream containing air, HCl gas, and SO2 gas can be scrubbed with water to produce an HCl stream which

EXAMPLE 1 (motive pressure given)

Require a scrubber for 800 CFM of contaminated air at 80°F. Pressure drop to the scrubber is 1" w.c. Δ P. Available water supply is 60 PSIG.

Since the pressure drop to the scrubber is 1". 1" w.c. draft will be required.

From the capacity curve, 800 CFM can be handled by an 88 Fume Scrubber. The required horsepower is 2.6.

$$GPM = \frac{(HP)(1714) \times \text{Size Factor}}{PSIG}$$

$$= \frac{(2.6)(1714) \times 1}{60} = 74.2 \text{ GPM}$$

EXAMPLE 2 [illegible]

Require a scrubber for 9,000 ACFM of air at 1½" draft with 900 GPM of 10% NaOH solution.

Since the curve for an 88 Fume Scrubber begins to flatten out at about 1,000 CFM, we need a unit with approximately 10 times the capacity.

$$\text{Size Factor} = \frac{\text{Desired Capacity}}{\text{Capacity of 88 Fume Scrubber}}$$

Looking at list of available units, the size factor for a 24 x 24 units is 9.0.

$$\frac{(\text{Desired Capacity})}{\text{Size Factor}} = \frac{\text{Equivalent Required Capacity of 88 Fume Scrubber}}{}$$

$$\frac{9,000}{9.0} = \frac{\text{Equivalent Required}}{\text{Capacity of 88 Fume Scrubber}} = 1000 \text{ CFM}$$

From capacity curve, required HP = 4.6.

SIZING

10x10	12x12	14x14	16x16	18x18	20x20
1.56	2.25	3.06	4.0	5.07	6.3

42x42	48x48	60x60	72x72
27.6	37.8	59.1	85.1

FORMULA: if available liquid flow is fixed
Required Pressure (in PSIG)

$$PSIG = \frac{(\text{Hydraulic HP})(1714)}{(\text{GPM})} \times \text{Size Factor}$$

Since we must use 900 GPM for scrubbing, the required pressure is:

$$PSIG = \frac{(\text{Hydraulic HP})(1714) \times \text{Size Factor}}{(\text{GPM})}$$

$$= \frac{(4.6)(1714) \times 9.0}{900} = 79 \text{ PSIG USE 80 PSIG}$$

From the curve it is obvious we can reduce the motive pressure required by increasing the size of the unit.

Taking the same problem as above, we will use a 30 × 30 unit.

$$\text{Equivalent Required Capacity of 88 Fume Scrubber} = \frac{9,000}{14.1} = 638 \text{ CFM}$$

From curve

Required HP = 2.15

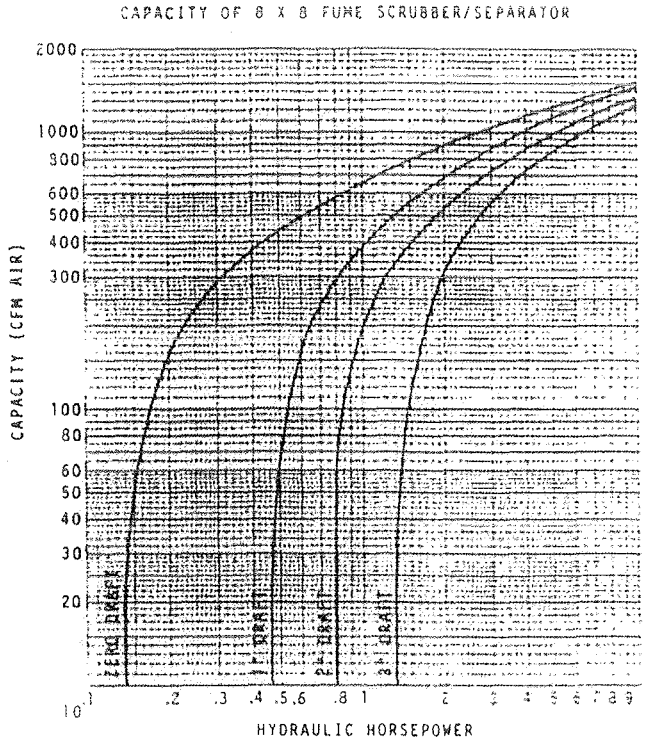
$$PSIG = \frac{(2.15)(1714)}{900} 14.1 = 58$$

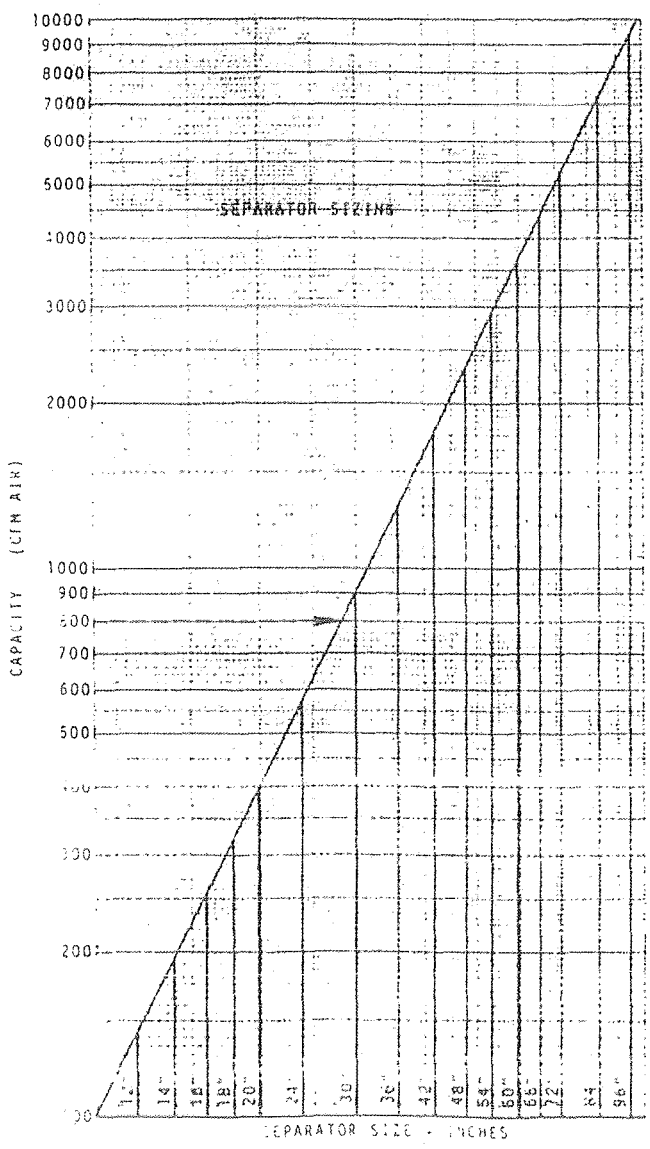
Use 60 PSIG

SCRUBBER SIZING

For EXAMPLE 1 of scrubber sizing, look on separator sizing curve for 800 CFM and draw a line across to the separator curve. A 30" diameter unit would be required.

For EXAMPLE 2, the required unit from the curve at 9,000 CFM is a 96" unit.



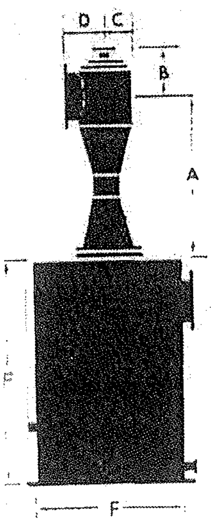


CUSTOM VERSUS STOCK UNITS

For optimum efficiency it is advisable to custom design Fume Scrubbers. When conditions are not accurately known, however, standard units may be the most economical answer. These units are available in fiberglass reinforced plastic construction which provides good general corrosion resistance. Their light weight allows use on roof areas without additional supporting steelwork. Roof mounting frees valuable floor space for other equipment. Separator tanks including storage for recycling are also furnished. Pilot plant test units are available for preliminary tests in your own plant. This may be particularly important if the pollutant is unusual or the actual operating conditions are unknown. Test facilities are also maintained at Croll-Reynolds for double checking on specific parameters.

MATERIALS OF CONSTRUCTION

Since the Croll-Reynolds Fume Scrubber has no moving parts or intricate construction, the problems of corrosion and erosion can be overcome much more readily. The choice of materials is almost unlimited. The Scrubber can be made from carbon steel, stainless steel, nickel or any of the non-ferrous alloys. It can be fabricated from fiberglass reinforced plastic (FRP), polyvinyl chloride (PVC), or other plastics, or it may be lined with an endless variety of appropriate material depending upon process need. Since various impurities in the gas flow may alter the resistance of materials to attack, your own experience with other equipment in similar service may prove to be the best judge. When this previous experience is not available, the answer may be found in our extensive case history file.



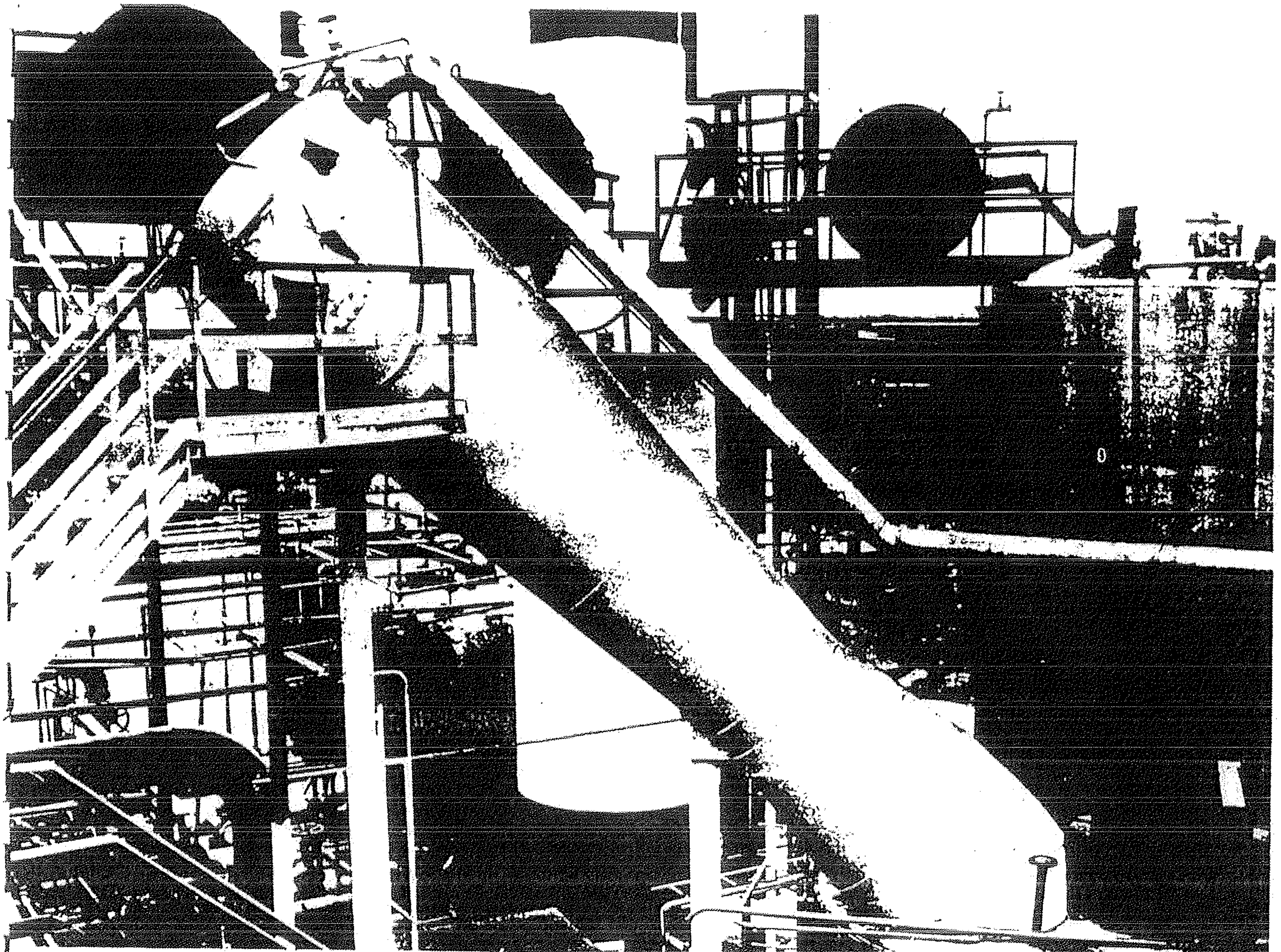
DIMENSIONS

Suct & Disch (For Scrubber)	SCRUBBER A	B	C	D	Weight Lbs.	SEPARATOR E	F
2"	12"	7"	–	5"		10	12
3"	16¼	7	–	5		12	12
4"	22⅜	6	–	6¼	45	16	18
6"	31	7⅝	–	7½	80	20	24
8"	3' - 3¾	9¼	9½	8¾	150	24	30
10"	4' - ¾	10⅜	10½	9¾	200	30	36
12"	4' - 10	11½	11½	10¾	280	36	48
14"	5' - 7½	12½	12½	11¾	330	42	48
16"	6' - 1½	13⅝	14	13½	430	48	60
18"	7' - 0	15⅜	15	14½	640	54	60
20"	8' - ¼	17	16	15½	900	60	66
24"	9' - 7½	25½	18½	18¼	1,250	72	78
30"	11' - 3½	29¼	21½	21¼	1,775	84	96
36"	13' - 1½	33½	24½	24¼	2,330	96	120
42"	14' - 11	3' - 2⅜	28½	28¼	3,025	120	144
48"	16' - 2	3' - 6⅜	31½	31¼	3,885	144	168
60"	17' - 8	4' - 3	3' - 1½	3' - 1⅝	7,275	144	180
72"	19' - 7	4' - 11¼	3' - 7½	3' - 8	10,200	144	192

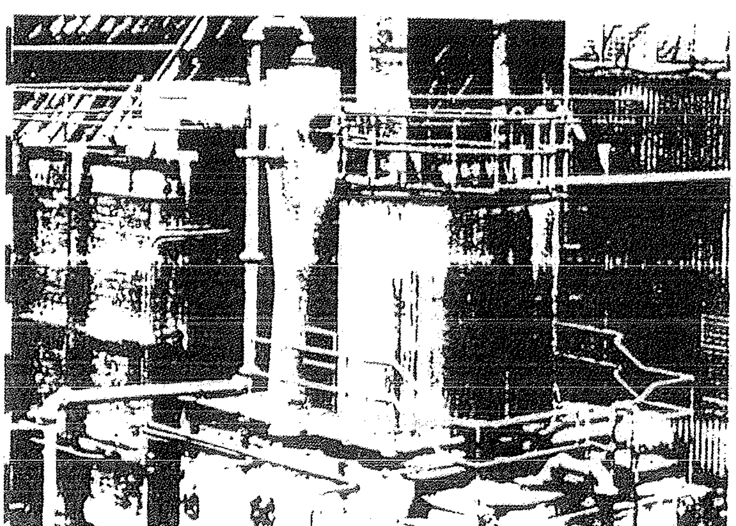
Water Flow GPM	Water Inlet
– 20	[illegible]
20 – 25	[illegible]
25 – 60	2
60 – 80	2½
80 – 125	3
125 – 175	3
175 – 225	4
225 – 500	6
500 – 850	8
850 – 1300	10
1300 – 1800	12
1800 – 2500	14
2500 – 3000	16
3000 – 4000	18
4000 – 5000	20
5000 – 7000	24

The weights are based on [illegible] welded steel construction. All flanges conform with 125 lb ANSI [illegible]

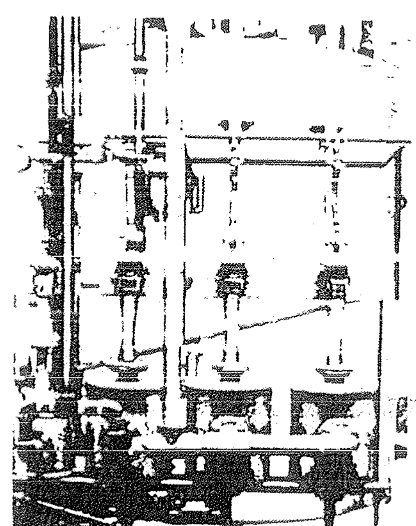
[illegible]



Venturi was tilted to fit among existing plant equipment



36" diameter Fume Scrubber handling 12,500 cfm of gas at [illegible] in phosphate operation

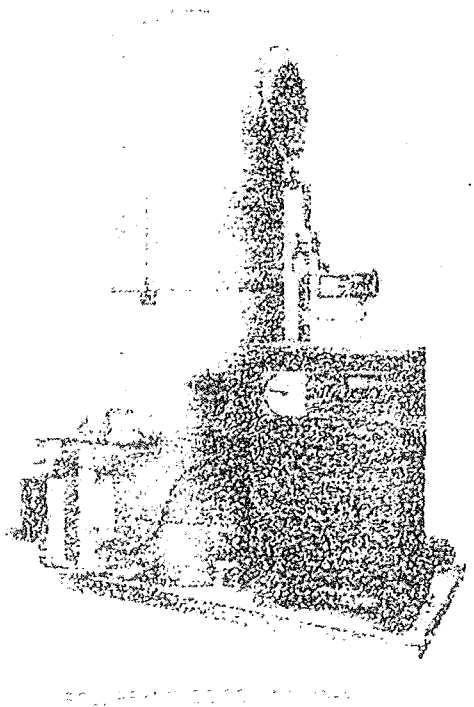


Several Croll-Reynolds Jet Venturi Fume Scrubbers handling HCl, HNO_3 and NH_3 at major chemical manufacturer

CROLL-REYNOLDS PACKED TOWERS

This complete line of countercurrent packed tower type scrubbers lets you select the most efficient unit for your air pollution control problems. The basic design of the Croll-Reynolds type of unit channels the gas flow upwards through a packed bed while the scrubbing liquid flows downward by gravity over the packing. This method is well suited to high efficiency gas absorption but is not recommended for use on dust collection applications.

In addition to air pollution applications, it can also be adapted to process needs. The internal components of the tower consist of a packing support plate, a packing bed, a liquid distributor, and a mist eliminator (see Figure A). The tower can be designed for once-through operation, or to recycle the liquid, depending upon process conditions.



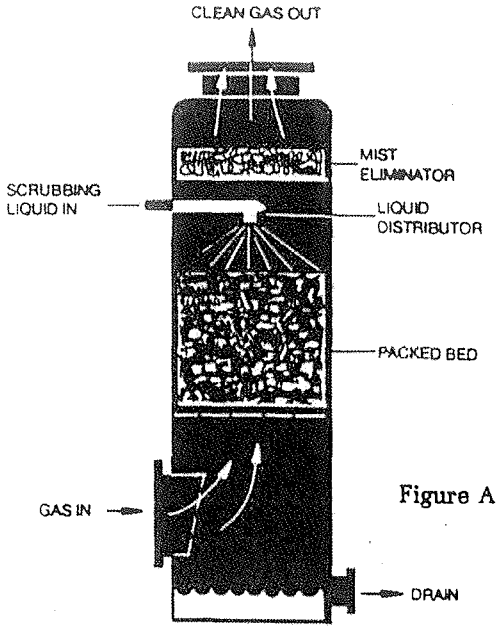


Figure A

EFFICIENCY

The Croll-Reynolds' countercurrent packed tower can be designed to achieve virtually as high an efficiency as required. Based upon actual test data and results from field installations, our engineers can select the type of packing, scrubbing liquid, and tower size best suited to your particular needs. Since these units are custom designed for each application, optimization of overall design results in an economic product at the required performance.

TYPE OF PACKING

The key to designing a packed column for air pollution control is the tower packing. It should be very open in design to minimize pressure drop while still maintaining a high surface where the absorption of the gas will occur. Spiral-Pac™ type tower packing will accomplish this. For other purposes, alternate packing may be selected. The type of packing most suitable for any application will vary with temperature, pressure, gas concentration, and efficiency requirements. Careful consideration is given to the various alternatives before selecting the packing for each application.

CONSTRUCTION MATERIALS

Croll-Reynolds packed towers are available in a wide variety of construction materials. Any material that can be fabricated can be made into a packed tower. For reasons of economy, tower shells are often made from FRP fiberglass reinforced plastic, stainless steel, Alloy 20, or any other material indicated for the specific application. Tower internal components can be made from polypropylene or other plastics for low initial cost, or any other materials including metals depending upon the process requirements.

DIMENSIONS AND APPROXIMATE SIZING

The overall dimensions shown in the table are based on a typical application of 1% HCl in an air stream with a 99% removal required. The dimensions given are for a fiberglass tower with typical nominal 2" Spiral-Pac™ and a standard mesh type mist eliminator.

ALTERNATE DESIGNS

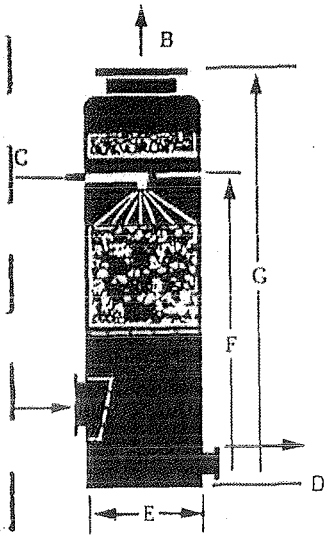
Counter-flow design towers offer the highest possible performance. Occasionally, space limitations or design limits require the use of cross flow or co-current flow. Croll-Reynolds has designed units for such applications and will design a custom unit for your needs.

High-pressure applications, Ethylene oxide removal, flue gas desulfurization, NO_x and phosgene scrubbing are examples of areas where Croll-Reynolds special experience can give you an economical and trouble-free system.

Where new or unusual problems face you, test units are available for in-plant use. In addition, our laboratory test facilities can be used to evaluate and select the packing and scrubbing solution best suited to your needs.

APPROXIMATE DIMENSIONS OF CROLL-REYNOLDS PACKED TOWERS

99% removal HCl (1% vol.) typical



Model #	Approximate CFM Capacity	Approximate Liquid Rate-GPM	Gas In & Out	Liquid In	Drain	Diam E	Height	
			A & B	C	D		F	G
12T-6H	300	3	8"	¾"	1"	1'0"	8'6"	10'0"
18T-6H	700	9	10"	1"	1½"	1'6"	9'6"	11'0"
24T-6H	1,300	16	14"	1½"	1½"	2'0"	10'0"	12'0"
30T-6H	2,000	25	18"	2"	2"	2'6"	11'0"	13'0"
36T-6H	3,000	35	20"	2"	2"	3'0"	11'6"	13'6"
42T-6H	4,000	48	24"	2"	3"	3'6"	12'6"	14'6"
48T-6H	5,000	60	28"	2"	3"	4'0"	13'6"	16'0"
54T-6H	6,500	80	30"	2"	3"	4'6"	15'0"	17'6"
60T-6H	8,000	100	36"	3"	4"	5'0"	15'6"	18'0"
66T-6H	10,000	120	36"	3"	4"	5'6"	16'0"	18'6"
72T-6H	12,000	140	42"	3"	4"	6'0"	16'0"	19'0"
84T-6H	16,000	190	48"	4"	6"	7'0"	17'0"	20'0"
96T-6H	21,000	250	54"	4"	6"	8'0"	18'0"	21'0"
108T-6H	27,000	320	60"	6"	6"	9'0"	18'6"	21'0"
120T-6H	33,000	400	66"	6"	8"	10'0"	19'0"	22'0"
132T-6H	40,000	475	72"	6"	8"	11'0"	20'0"	23'0"
144T-6H	50,000	575	84"	8"	8"	12'0"	20'0"	23'0"

Units normally include four hold-down lugs.

Towers up to 2'6" diameter have flanged tops. Towers 3'0" in diameter and up have manway for packing installation and inspection.

Dimensions do not include storage capacity, which varies. Most units will have storage so that liquid can be recirculated.

Larger capacity sizes shown in the bulletin can be shop fabricated and shipped direct to the job site. For larger applications, field-erection or multiple units would be required. Croll-Reynolds can provide the necessary technology to design larger units. Flows of close to 500,000 acfm have been handled in Croll-Reynolds scrubbers in a single unit. Please contact the factory directly for further information on a specific application.

Appendix I

Snowmaking-General Information

Appendix I

Snowmaking - General Information

Size Storage Reservoir

Withdraw from the pond at a rate of 1200 gpm and recharge from the brook at a rate of 500 gpm, therefore 1200 - 500 = 700gpm.
700 gpm x 73 hours to cover trails x 60 minutes/hour = 3,066,000 gallons

Estimate Pond Footprint

Volume = 3,000,000 gallons
Depth = 3 feet

$\frac{3{,}000{,}000 \text{ gal}}{7.481 \text{ gal/CF}}$ = 401,016 CF

$\frac{401{,}016 \text{ CF}}{3 \text{ FT}}$ = 133,672 SF

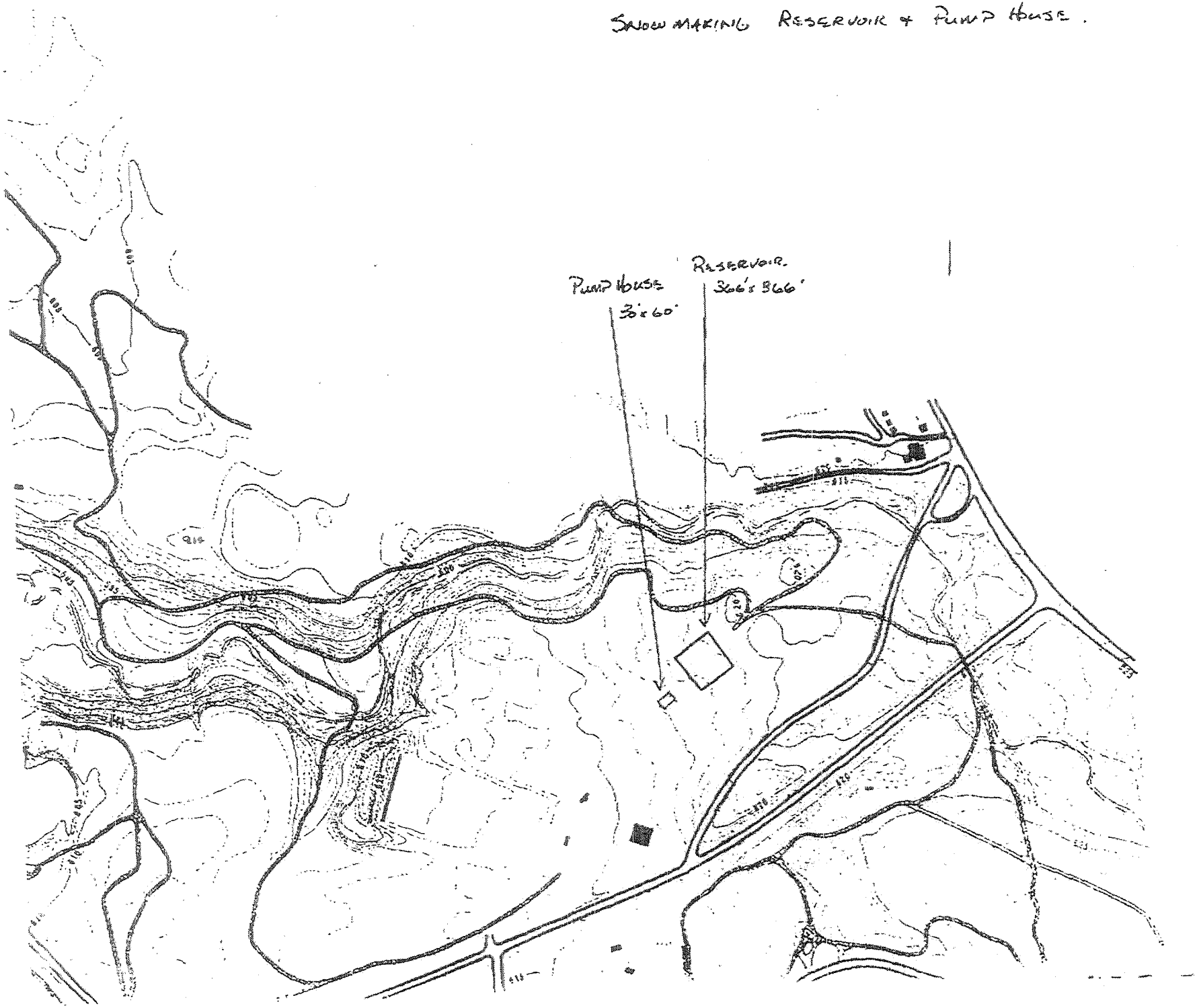
= 366 feet x 366 feet

3 feet of ice = 3×10^6 gal
3 feet of usable storage = 3×10^6 gal
2 feet of dead storage = 2×10^6 gal
(to keep intake off pond bottom)

Total = 8×10^6 gal
with a depth of 8 feet

A 6 inch diameter polyvinyl chloride pipeline from the existing pumphouse on North Meadow Brook to the reservoir (a distance of 2,600± feet) will be installed along existing accessways (therefore no vegetative cutting is required). A pump of 30-40 horsepower will be required to withdraw water at a rate of 500 gpm at the brook pumphouse.

APPROXIMATE LOCATIONS OF
SNOW MAKING RESERVOIR & PUMP HOUSE.



JOHN T. MATHEWSON COMPANY

ROUTE 44 WEST, NORFOLK, CONNECTICUT 06058 TELEPHONE: (203) 542-5418 SNOWMAKING SYSTEMS

MAY 16, 1996

OLYMPIC REGIONAL DEVELOPMENT AUTHORITY
MR. TOM COLBY
PO BOX 1980
LAKE PLACID, NY 12997

DEAR TOM:

I HAVE STUDIED THE SCALED TOPOGRAPHICAL LAYOUT OF THE CROSS COUNTRY TRAILS YOU ARE CONSIDERING COVERING WITH MACHINE MADE SNOW AND HAVE DESIGNED A SYSTEM I BELIEVE WILL BEST SUIT THE CONDITIONS YOU EXPLAINED TO ME.

MY NOTES TAKEN AT OUR MEETING SPELL OUT THE FOLLOWING;

1. YOU WANT TO HAVE THE ABILITY TO PRODUCE SNOW IN SUFFICIENT QUANTITY TO ASSURE BEING OPEN BY EARLY TO MID DECEMBER EVEN WHEN YOUR AMBIENT CONDITIONS ARE WARMER THAN AVERAGE.

2. THAT MACHINE MADE SNOW IS LAID DOWN LARGELY ON THE TRAILS TO AVOID DAMAGE TO ADJACENT FLORA.

3. PIPES WILL LARGELY HAVE TO BE ABOVE GROUND BECAUSE PREVALENCE OF ROCKS AND LEDGE ROCK WOULD MAKE THE COST OF BELOW GROUND INSTALLATION PROHIBITIVE.

(THE TRAIL LENGTH IS ABOUT 7.6 KM. (24,928').
THE TRAIL WIDTH AVERAGES --------- (28')
24,928' X 28'= 697,984 SQ.FT. / 43,560 SQ FT.= 16 ACRES
16 ACRES X 27,157 GALS. X 8 ACRE/INCHES = 3,476,096 GALS. OF WATER REQUIRED TO PRODUCE ABOUT 20" OF SNOW DEPTH.
3,476,096 X 1.25 = 4,345,120 GALS. (INCLUDING FACTOR FOR LOSSES DUE TO EVAPORATION, DRIFTING, ETC;)
THE TERRAIN IS UNDULATING, WITH A MAXIMUM ELEVATION OF ABOUT 300' ABOVE THE SNOW MAKING WATER LEVEL)

4. SNOWMAKING WILL MOST OFTEN COMMENCE IN MID OR LATE NOVEMBER WHEN A COLD FRONT ARRIVES THAT IS FORECAST TO LAST FOR SEVERAL DAYS AND CONTINUE UNTIL THE DESIRED SNOW COVERAGE IS ATTAINED. (AT THIS TIME STREAM FLOW IS USUALLY GOOD BECAUSE OF AUTUMN RAINS AND LACK OF SUSTAINED COLD WEATHER TO FREEZE THE STREAM TRIBUTARIES.)

5. ALL METHODS OF SNOW MAKING ARE TO BE EVALUATED, FAN TYPE WITHOUT COMPRESSED AIR, FAN TYPE USING COMPRESSED AIR, COMPRESSED AIR/WATER BASED ON EXTERNAL MIX AND COMPRESSED AIR AND WATER INTERNALLY MIXED.

BECAUSE IT IS A MAJOR FACTOR RELATED TO SEVERAL OF THE OTHER CONSIDERATIONS LET'S ADDRESS CONSIDERATION (5.) FIRST.

EUROPEAN AGENT: JOHN T. MATHEWSON COMPANY
DIR. ALEXANDER REINER FACH 43, A-5400 VIGAUN-9, HALLEIN AUSTRIA
TEL. 43 6245 4200

FAN TYPE WITHOUT COMPRESSED AIR.

THERE IS ONLY ONE UNIT OF THIS DESCRIPTION ON THE MARKET, THE SMI 320.

THE ADVANTAGES ARE:

THE RELATIVELY LOW DIRECT ENERGY COST TO MAKE SNOW IN COLDER TEMPERATURES. THEY OPERATE ON EITHER 230 OR 460 VOLT 3 PHASE ELECTRICAL POWER AND REQUIRE ABOUT 13.5 KWH PER UNIT. NO COMPRESSED AIR OR COMPRESSED AIR PIPING IS NEEDED. THE UNIT PRICE TO PURCHASE IS ABOUT HALF THAT OF ANY FAN TYPE BASED ON COMPRESSED AIR.

THE DISADVANTAGES ARE:

THEY ARE VERY POOR PERFORMERS UNTIL THE AMBIENT TEMPERATURE IS ABOUT 5 DEG. F. COLDER THAN THAT FOR AN INTERNALLY MIXED COMPRESSED AIR GUN. IN ORDER TO COMPENSATE IT IS COMMON PRACTICE TO TOWER MOUNT THEM TO HEIGHTS OF 15'- 40'. THEY HAVE VERY LITTLE 'THROW' SO THAT IN A 'NO WIND' CONDITION THE SNOW ACCUMULATES IN A PILE DIRECTLY UNDER THE FAN. THE RESULTING PILES WOULD HAVE TO BE MACHINE SPREAD BY GROOMING VEHICLES. THE UNITS EACH WEIGH SEVERAL HUNDRED POUNDS AND MOVING THEM FROM TOWER TO TOWER IS LABOR INTENSIVE. WITH ANY WIND, LARGE QUANTITIES OF SNOW WOULD LAND OFF THE TRAILS CAUSING ENVIRONMENTAL DAMAGE AND DELAY TRAIL COVERAGE.

FAN TYPE WITH COMPRESSED AIR

THESE UNITS CONSIST OF AN ELECTRICALLY DRIVEN FAN IN A VENTURI, MOUNTED ON A PORTABLE FRAME. MULTIPLE WATER NOZZLES ARE MOUNTED AROUND THE DOWNSTREAM END OF THE VENTURI ALONG WITH A FEW NOZZLES DELIVERING COMPRESSED FOR NUCLEATION. THE COMPRESSED AIR IS SUPPLIED BY A SMALL AIR COMPRESSOR MOUNTED ON THE FRAME WHICH IS DIRECTED INTO THE EMERGING WATER TO START THE FREEZING PROCESS. THE FAN BLOWS COLD AMBIENT AIR THROUGH THE VENTURI TO MIX WITH THE PLUME OF WATER AND COMPRESSED AIR TO PROVIDE 'MIX' AND 'THROW'.

THE ADVANTAGES ARE:

THEY CAN BE GROUND MOUNTED ON A SLED OR WHEELED FRAME SO THAT THEY ARE MORE PORTABLE THAN THE SMI 320. THEY PRODUCE A HIGH VOLUME OF SNOW IN COLD AMBIENT CONDITIONS, ABOUT TWICE THAT OF THE SMI 320. THEY REQUIRE ABOUT 20 TO 35 KWH SO ARE VOLUMETRICALLY EFFICIENT. LIKE THE SMI 320, NO COMPRESSORS OR AIR LINE ARE NEEDED.

THE DISADVANTAGES ARE:

THEY DELIVER A WIDE SNOW PATTERN UNDER ANY SNOWMAKING CONDITION SO THAT A LARGE PERCENTAGE OF SNOW FALL OFF THE TRAIL NETWORK. THE SNOW NOT LANDING ON THE TRAILS WOULD BE WASTED AND BE ENVIRONMENTALLY DAMAGING. THEY ARE HEAVY, WEIGHING FROM ABOUT 1000 TO 2500 POUNDS EACH. THEY ARE POOR PERFORMERS IN MARGINAL AMBIENT WEATHER CONDITIONS. THEY ARE LABOR/MACHINE INTENSIVE AND ARE COMPLETELY OUT OF THEIR ELEMENT ON 28' WIDTH TRAILS.

EXTERNAL MIX COMPRESSED AIR/WATER.

THIS TECHNOLOGY GOES BACK TO THE INVENTION OF THE SNOW MAKING PROCESS. IT IS THE SAME TECHNOLOGY USED WITH THE FAN GUNS USING COMPRESSED AIR BUT WITHOUT THE FAN AND VENTURI. ALSO, 'PLANT' COMPRESSED AIR IS USED WITH A PIPING NETWORK INSTEAD OF AN 'ON BOARD' COMPRESSOR FOR EACH GUN. THERE ARE CURRENTLY SEVERAL MANUFACTURERS OF THIS TYPE OF GUN. THEY ARE H.K.D., RATNIK AND SNOW DIAMONDS.

THE ADVANTAGES ARE:

THE EXTERNAL MIXING OF THE COMPRESSED AIR AND WATER RESULTS IN THE SAME LOW VOLUME OF COMPRESSED AIR USED UNDER ANY AMBIENT CONDITION. THEY REQUIRE FAR LESS ENERGY THAN INTERNAL MIX GUNS AND PRODUCE SNOW SIMPLY AND ECONOMICALLY. THEY COST FAR LESS TO BUY THAN ANY TYPE OF FAN GUN. THEY ARE, BY THEMSELVES, LIGHT AND SIMPLE.

THE DISADVANTAGES ARE:

THE MAIN DISADVANTAGE IS THE FACT THAT THESE UNITS ARE POOR PERFORMERS IN WARMER CONDITIONS. ANOTHER DISADVANTAGE IS THEIR NEED TO BE MOUNTED FROM 16 TO 40 FEET ABOVE THE GROUND TO PRODUCE SNOW EFFECTIVELY. THE H.K.D IS MOUNTED ON A TOWER ABOUT 36'IN HEIGHT. TO MAKE SNOW, THEY REQUIRE TEMPERATURES COLDER THAN 24 DEG. F. THE HEIGHT RESULTS IN THE SAME INABILITY TO LIMIT THE SNOW TO THE THE WIDTH OF THE TRAIL WHENEVER THE WIND IS BLOWING. THE SNOW DIAMONDS, (OF WHICH I AM A DISTRIBUTOR) CAN MAKE SNOW WHENEVER AN INTERNAL MIX GUN CAN AND IN THE SAME OR HIGHER QUANTITIES. IT HAS FAR TOO LARGE A PATTERN TO MERIT CONSIDERATION FOR USE ON TRAILS 28' WIDE, HOWEVER.

INTERNAL MIX COMPRESSED AIR/WATER GUNS

THIS IS THE BASIC TYPE OF GUN USED ON EVERY MAJOR SNOW MAKING SYSTEM. IT COMBINES COMPRESSED AIR AND WATER INTERNALLY WHICH ENTERS THE ATMOSPHERE AS AN EXPANDING AEROSOL, FREEZES, AND FALLS TO THE GROUND AS MACHINE MADE SNOW. THE COMPRESSED AIR USE IS INVERSELY RELATED TO THE VOLUME OF THE WATER FLOW.

THE ADVANTAGES ARE:

SIMPLICITY, RANGE OF EFFECTIVENESS FROM AMBIENT TEMPERATURES VERY CLOSE TO FREEZING TO EXTREME SUB ZERO, CAN EASILY BE DIRECTED TO MAKE SNOW WHERE YOU WANT IT, LIGHT WEIGHT EASY TO MOVE, ADJUST, START UP AND SHUT DOWN. FAR AND AWAY THE MOST VERSATILE SNOW MAKING DEVICE AVAILABLE. THERE ARE A LARGE NUMBER OF TYPES THAT CAN MEET A VARIETY OF CONDITIONS. THEY OPERATE EFFECTIVELY FROM CLOSE TO GROUND LEVEL MOUNTED ON STANDS OR SLEDS AND ARE THE ONLY TYPE THAT MEET YOUR CONDITIONS.

THE DISADVANTAGES ARE:

THE ONLY DISADVANTAGE IS THE FACT THEY CONSUME MORE DIRECT ENERGY THAN THE OTHER TYPES.

CONCLUSION

FOR YOUR APPLICATION OF MAKING SNOW ON NARROW TRAILS FOR LONG LINEAL DISTANCES UNDER A VERY WIDE RANGE OF WEATHER CONDITIONS THE USE OF THE INTERNAL MIX COMPRESSED AIR GUNS IS THE ONLY VIABLE SOLUTION. YOUR FAR LOWER LABOR COSTS WILL LARGELY OFF-SET THEIR HIGHER ENERGY COST. FEWER REPAIRS AND LESS 'DOWN TIME' WILL BE OTHER BENEFITS. ALSO, THEY WILL PROVIDE AN EARLIER OPENING DATE, QUICKER RECOVERY AFTER A THAW AND BETTER SNOW CONDITIONS ALL SEASON.

THE PROPOSED SYSTEM IS BASED ON THE USE OF SPECIALIZED SNOW GUNS TO MEET YOUR CONDITIONS. THE DESIGN WILL INCORPORATE PROVEN TECHOLOGY ALTERED TO PROVIDE A LONG, NARROW 'THROW'. THE GUNS WILL BE SLED OR TRIPOD MOUNTED. THEY WILL BE ENGINEERED TO CONVERT ABOUT 20 GPM TO SNOW AT ABOUT 25 DEG. F. AND USE ABOUT 200 S.C.F.M. AT 100 PSI UNDER THAT AMBIENT CONDITION. THAT IS A RATIO OF ABOUT 10 S.C.F.M. TO 1 GPM. UNDER COLDER CONDITIONS, ABOUT 15-18 DEGREES, THE RATIO WILL IMPROVE TO ABOUT 5 OR 6 S.C.F.M. TO I GPM.

WATER WILL BE SUPPLIED TO THE WATER LINES SERVING THE TRAILS BY TWO VERTICAL TURBINE PUMPS, EACH RATED TO DELIVER 600 GPM AT 750' TDH. (325 PSI), EACH PUMP WILL BE DRIVEN BY A 150 HP. 3/60/460 ELECTRIC MOTOR. THE PUMPS WILL BE INSTALLED IN 'PARALLEL' SO THAT EITHER OR BOTH CAN BE USED AS REQUIRED.

COMPRESSED AIR WILL BE SUPPLIED BY EITHER ELECTRICALLY DRIVEN AND/OR DIESEL DRIVEN AIR COMPRESSORS. THE COMPRESSED AIR VOLUME SHOULD BE 6000 S.C.F.M. AT 100 PSI. AND AFTERCOOLED.

PERFORMANCE OF THE SYSTEM WILL BE BASED ON THE USE OF ONE PUMP AND ABOUT 30 GUNS IN WARM AMBIENT CONDITIONS, (MID TO UPPER 20'S, AT WHICH POINT THE COMPRESSED AIR CAPACITY WILL BE ABOUT FULLY USED.

THE THIRTY GUNS WILL BE SET AT 135' SPACING, WHICH IS THE PREFERRED HYDRANT SPACING BASED ON TWO LENGTHS OF 50' AIR AND TWO LENGTHS OF 50' WATER HOSE. THE DOUBLE HOSE LENGTHS WILL PLACE THE GUNS ABOUT 35' TO 40' FROM THE NEXT SET OF HYDRANTS. THE GUNS WILL HAVE SUFFICIENT 'THROW' TO REACH THAT DISTANCE. THIRTY GUNS SET OUT IN THIS MANNER WILL ALLOW 4,050' OF TRAIL WILL BE COVERED AT A SETTING. (30 GUNS X 135'= 4,050'). EACH OF THE GUNS WILL HAVE TO BE MOVED BACK SEVERAL TIMES TO COVER ITS' ALLOTED 135'. EACH SETTING WILL BE FOR ABOUT 21 HOURS AND ABOUT 6.2 SETTINGS WILL BE REQUIRED TO COVER THE ENTIRE TRAIL LENGTH. (25,000'/4,050' = 6.2 SETTINGS, 6.2 X 21 HOURS = 130 HRS.)

IN COLDER WEATHER, 20 F. AND COLDER, UP TO 40 GUNS CAN BE OPERATED, EACH GUN DELIVERING ABOUT 30 GPM AND USING ABOUT 150 S.C.F.M. PER GUN. THIS WILL ABOUT USE UP THE WATER DELIVERED BY BOTH PUMPS AND ALSO THE 6000 S.C.F.M COMPRESSOR CAPACITY. IT WILL COVER ABOUT 5400' AT A SETTING (40 GUNS X 135'= 5400') AND REQUIRE ABOUT 14 HOURS PER SETTING. IT WILL REQUIRE ONLY ABOUT 5 SETTINGS

AND AS LITTLE AS 73 HOURS OF ACTUAL SNOWMAKING TO ACHIEVE THE PROJECTED COVERAGE.

TO THE ABOVE HOURS THE 1.25 FACTOR DESCRIBED MUST BE ADDED AND ALSO A TIME FACTOR TO SET OUT AND START UP THE GUNS. I RECOMMEND THAT ABOUT EIGHTY GUNS BE ON HAND, EACH WITH FOUR LENGTHS OF HOSE. THIS WOULD ALLOW UP TO 80 GUNS TO BE READY TO MAKE SNOW WITH THE ARRIVAL OF COLD WEATHER. THIS WAY, ONE CREW COULD BE SHUTTING DOWN AND DRAINING OFF A SECTION OF SNOWMAKING WHILE A SECOND CREW WAS STARTING UP THE OTHER GUNS. MANY HOURS CAN BE SAVED IN THIS MANNER.

DESCRIPTION OF THE PROPOSED SYSTEM

WATER IMPOUNDMENT

IT IS MY UNDERSTANDING WATER IS TO BE SUPPLIED BY THE SAME STREAM I USED IN SETTING UP THE TEMPORARY SYSTEM TO BUILD THE PILE OF SNOW TRUCKED TO THE CROSS COUNTRY TRAILS, FOR THE 1980 OLYMPICS. THAT WAS AN EMERGENCY SITUATION AND WATER WAS PUMPED BY A DIESEL DRIVEN PUMP RATED TO DELIVER ABOUT 900 GPM. WE MERELY SAND BAGGED THE STREAM AND PUMPED WATER TO THE GUNS. NO FLOW METERING WAS DONE. WE HAD PLENTY OF WATER FOR SNOW MAKING NEEDS BUT I HAVE NO IDEA OF THE FLOW RATE LEFT OVER.

THE D.E.C. WILL HAVE TO SIZE THE WATER STORAGE POND BASED ON THEIR KNOWLEDGE OF THE HISTORIC FLOW RATES OF THE STREAM FOR NOVEMBER, DECEMBER AND JANUARY. THEY CAN FACTOR IN AN ENVIRONMENTALLY SAFE FLOW RATE THE STREAM CAN PROVIDE, ICE THICKNESS, THE LEAST TIME IT WILL TAKE TO DELIVER THE SNOW TO THE TRAIL SYSTEM, (ASSUME 100 HOURS), ETC; AND SIZE THE STORAGE POND. FLOW OVER THE SNOW MAKING TIME SPAN ABOVE. (ABOUT 100 HRS. MINIMUM BASED ON CONTINUOUSLY COLD WEATHER). ASSUME A TOTAL INITIAL NEED, INCLUDING RESERVE, 4,475,000 GALLONS.

PUMPING STATION/STORAGE/COMPRESSOR BUILDING

THE PUMP/COMPRESSOR STORAGE BUILDING SHOULD BE A MINIMUM OF 30' X 60'. THE FOUNDATION SHOULD BE OF CONCRETE AND EQUIPPED WITH A PUMP SUMP, DRAIN SUMP, PIPE TRENCH AND CONCRETE FLOOR. ALSO, SINGLE PHASE ELECTRICITY FOR HEAT AND LIGHT, CONTROLS, ETC;

EQUIPMENT NEEDED

PUMPS

TWO (2) ELECTRICALLY DRIVEN (150 HP 3/60/460) VERTICAL TURBINE PUMPS, EACH RATED TO DELIVER 600 GPM AT 750' TDH. AND EQUIPPED WITH COLUMNS, STRAINERS, MECHANICAL SEALS, MANIFOLDING, VALVING, PRESSURE GAUGES AND FLOW METERS. ALSO, TWO 150 HP. COMBINATION REDUCED VOLTAGE STARTERS (SOFT START TYPE).

AIR COMPRESSORS

ELECTRICALLY DRIVEN, PORTABLE DIESEL DRIVEN, OR A COMBINTION OF

OF THE TWO, DATED TO DELIVER ABOUT 6000 S.C.F.M OF AMBIENT AIR COMPRESSED TO A MINIMUM OF 100 PSI. IN VIEW OF THE RECENT LEGISLATION PERTAINING TO ALLOWING COMPETITION BETWEEN ELECTRICAL UTILITY COMPANIES, LEASING DIESEL DRIVEN COMPRESSORS FOR SEASON MAY BE THE BEST OPTION INITIALLY. OF THE COMPRESSOR TYPES, ELECTRICALLY DRIVEN MULTI STAGE ARE PREFERRED DUE TO THEIR LOW COST TO PURCHASE AND OPERATE. DIESEL DRIVEN TWO=STAGE DRY SCREW COMPRESSORS ARE AVAILABLE FOR RENTAL AT A COST PER CFM THAT ONLY SLIGHTLY HIGHER THAN FOR SINGLE STAGE WET SCREWS AND SHOULD BE CONSIDERED.

TRAIL PIPING

WATER AND AIR, DOUBLE RANDOM, BLACK WALL, ROLL GROOVED FOR VICTAULIC STYLE #77 COUPLINGS. FIELD INSULATED.

8" X .219	WALL A.S.T.M. A-53 GR-B OR API 5L	12,000'
6" X .188	" " " " "	33,500'
4" X .188	" " " " "	5,000'

ESTIMATED VICTAULIC STYLE #77 COUPLINGS REQUIRED.

400	8"
1,120	6"
165	4"

ESTIMATED VICTAULIC ELBOWS AND REDUCERS REQUIRED.

80	8"
170	6"
35	4"

ESTIMATED NUMBER OF #300 WATER LINE HEATED ISOLATION VALVES REQUIRED.

5	8"
5	6"

ESTIMATED NUMBER OF 2" X #300 LOW POINT HEATED DRAIN VALVES REQUIRED.

FIELD DETERMINE + 10 (ONE WITH EACH ISOLATION VALVE AND ONE PAIRED WITH EACH LOW POINT SOLENOID VALVE)

ESTIMATED NUMBER OF 2" X #300 LOW POINT HEATED SOLENOID DRAIN VALVES REQUIRED.

FIELD DETERMINE

ESTIMATED SETS OF WATER AND AIR HYDRANTS/VALVES INCLUDING THREADOLETS AND CAMLOCK HOSE CONNECTORS.

225

ELECTRICAL TRAIL WIRING REQUIRED

220 VOLT SINGLE PHASE # 8 WIRE DESIGNED FOR DIRECT BURIAL 25,000'
CONDUIT REQUIRED.
TYPE-- (TO COMPLY WITH DEC AND CODE) UP TO 25,000'

SNOW GUNS

RECOMMENDED, SPECIAL DESIGN SNOW GUNS
80 TRIPOD MOUNTED, $600 EA. OR,
SLED MOUNTED, $700 EA.

SNOW HOSE

ESTIMATED LENGTHS OF SNOW HOSE, 50' X 1 1/2" FITTED WITH M AND F CAMLOCK TYPE FITTINGS, INCLUDING SPARES.
350

SUBMITTED BY:

JOHN T. MATHEWSON
JOHN T. MATHEWSON COMPANY

JOHN T. MATHEWSON COMPANY
ROUTE 44 WEST, NORFOLK, CONNECTICUT 06058 TELEPHONE: (203) 542-5418 SNOWMAKING SYSTEMS

MAY 23, 1996

THE L.A. GROUP
40 LONG ALLEY
SARATOGA SPRINGS
NY 12866

ATTN: HOLLY ELMER

DEAR HOLLY:

IT WAS A PLEASURE TO MEET YOU AND DISCUSS THE CROSS COUNTRY PROJECT.

YOU HAVE ALL OF THE BASIC INFORMATION IN MY SUBMITTAL. NOTHING CHANGES AS FAR AS THE PROPOSED SNOW MAKING IS CONCERNED EXCEPT A REVISION OF THE WATER VOLUME NEEDED FOR TRAILS 20 FEET WIDE AS OPPOSED TO 28 FEET WIDE.

AS BEFORE, I RECOMMEND LAYING DOWN ABOUT 8 INCHES OF WATER IN THE FORM OF MACHINE MADE SNOW. THE DENSITY OF BASE SNOW IS IN THE RANGE OF 40 PERCENT WATER SO EIGHT INCHES OF WATER PRODUCES A SNOW DEPTH OF ABOUT 20 INCHES. THIS IS EXCLUSIVE OF LOSSES DUE TO EVAPORATION IN THE SNOW MAKING PROCESS, WIND, SOME UNFROZEN WATER IF THE GUNS ARE ADJUSTED FOR COLDER TEMPERATURES AND IT TURNS WARM QUICKLY, ETC; IN PRACTICE, THERE WILL BE FAR IN EXCESS OF 20 INCHES IN THE CENTER OF THE TRAILS AND CONSIDERABLY LESS NEAR THE EDGES.

THE CRITICAL SNOW MAKING IS DONE EARLY IN THE SEASON, USUALLY IN MID NOVEMBER OR EARLY DECEMBER WHEN SEVERAL DAYS OF COLD WEATHER IS FORECAST. IT IS FAR MORE COST EFFICIENT TO MAKE SNOW 24 HOURS A DAY THAN BROKEN INTO SHORTER PERIODS BECAUSE OF THE HIGH WORK LOAD AND TIME REQUIRED TO SHUT THE SYSTEM DOWN, TRANSPORT HOSES AND GUNS TO THE STORAGE LOCATION, THEN HAVING TO REPEAT THE LENGTHY RESTART PROCESS.

SUFFICIENT WATER MUST BE AVAILABLE AT THIS TIME SO THAT YOUR INITIAL COVERAGE CAN BE ACHIEVED. IF IT REMAINS COLD LITTLE SNOW IS LOST. IF SNOW IS LOST AT THIS TIME OF THE YEAR IT VERY INFREQUENTLY DUE TO PROLONGED WARM DRY WEATHER. INSTEAD IT IS LOST TO WET WEATHER. WITH THE WET WEATHER, WATER FOR SNOW MAKING AGAIN IS PLENTIFUL.

WE ARE LOOKING AT ROUGHLY 25,000 LINEAL FEET OF TRAIL WITH AN AVERAGE WIDTH OF 20 FEET TO COVER WITH MACHINE MADE SNOW.

25,000 X 20 = 500,000 SQUARE FEET
500,000 / 43,560 = 11.48 ACRES (CALL IT 11.5 ACRES)

EUROPEAN AGENT: JOHN T. MATHEWSON COMPANY
DIR. ALEXANDER REINER FACH 43, A-5400 VIGAUN-9, HALLEIN, AUSTRIA
TEL.: 43-6245/4200

11.5 ACRES X 27,157 (GAL. PER ACRE INCH) X 8 (INCHES OF DEPTH) = 2,498,444 GALLONS (CALL IT 2.500.000)
2,5 MILLION GALLONS X 1.25 (SAFETY FACTOR) = 3,125,000 GAL. NEEDED.

THE STORAGE POND, THEREFORE, SHOULD BE SIZED TO RELIABLY PROVIDE THIS VOLUME OF WATER. PROVISION MUST BE MADE FOR ICE. A DEEP POND IS FAR PREFERABLE TO A SHALLOW ONE, ESPECIALLY WHEN THE RECOVERY RATE IS SLOW BECAUSE OF THE COLD WEATHER DANGER OF IT FREEZING AT LOW LEVELS OF THE POND.

TWO PUMPS ARE PLANNED WITH EACH PUMP DELIVERING 600 GPM. IN WARMER WEATHER ONLY ONE PUMP MAY BE IN USE. IN COLD WEATHER BOTH PUMPS WILL OPERATE AND THE FLOW RATE COULD BE AT 1200 GPM. THE 'WORST CONDITION' FROM THE STANDPOINT OF WATER IMPOUNDMENT WOULD BE HAVING BOTH PUMPS RUNNING AT FULL CAPACITY PERIOD. LET'S LOOK AT IT.

3,125,000 GALLONS (INCLUDING SAFETY FACTOR) / 1200 GPM / 60 (MIN.) = 43.4 HOURS. AT THIS POINT THE TRAILS WOULD BE FULLY COVERED WITH VERY GOOD SNOW COVER THAT IS BOTH DENSE AND DEEP.

THE 1200 GPM FLOW RATE / 7.481 (GAL. PER CU. FT.) / 60 (SECONDS) = 2.67 CFS. IF RECORDED FLOW DATA FOR NOVEMBER AND DECEMBER SHOWS A GUARANTEED SUBSTANTIAL FLOW RATE ABOVE THE D.E.C. REQUIREMENT FOR THE BROOK, THE QUANTITY OF WATER AVAILABLE TO REPLENISH THE POND COULD BE CONSIDERED IN DETERMINING ITS SIZE.

A FINAL CONSIDERATION IS POSSIBLE FUTURE EXPANSION. IT WOULD BE MORE COST EFFECTIVE TO PLAN FOR IT NOW.

SINCERELY,

JOHN T. MATHEWSON

Station 4274000 West Branch Ausable River, near Lake Placid

MEAN DISCHARGE - cubic feet per second
Normal monthly means (all days)

Year	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Annual Mean
1916										229.0	58.5	87.0	
1917	117.2	158.6	187.1					453.8	565.3	101.4	69.4	103.1	
1918	333.4	137.5	67.4										
1919											68.1	186.0	
1920	152.8	99.5	97.2	48.0	55.0	280.0	532.2	379.6	97.2	191.7	74.5	74.3	173.8
1921	186.0	169.9	351.6	122.3	81.6	832.3	356.1	108.3	75.6	63.6	54.1	40.7	205.0
1922	105.4	225.0	144.4	57.1	148.4	385.6	704.2	345.0	342.4	117.2	65.0	44.0	223.1
1923	61.0	81.4	51.4	50.7	22.9	119.8	647.1	402.6	298.9	58.9	37.8	64.8	158.0
1924	87.4	87.6	226.5	242.6	68.3	78.1	439.8	933.3	179.5	82.1	85.5	218.6	228.3
1925	258.2	145.3	124.4	42.3	285.1	446.9	413.1	370.4	299.3	188.6	152.9	201.0	243.4
1926	347.6	343.5	219.3	138.5	61.1	74.9	600.6	615.3	349.5	106.0	183.5	135.3	265.2
1927	254.0	386.1	84.7	73.7	87.1	317.7	277.0	381.9	122.5	156.3	114.5	97.4	196.7
1928	260.6	553.8	402.6	161.6	112.6	301.6	631.3	527.1	246.4	139.7	158.6	145.4	303.5
1929	186.4	217.4	136.5	174.7	85.5	398.4	652.7	498.5	274.1	198.5	103.6	86.7	251.8
1930	165.7	190.4	190.7	366.1	147.2	192.8	570.4	611.1	294.6	117.7	65.3	57.9	248.0
1931	62.6	86.4	63.9	42.6	37.1	66.5	607.5	385.5	123.3	158.9	52.1	98.6	148.8
1932	83.5	200.6	110.8	291.8	147.6	78.6	564.4	543.7	181.4	304.7	131.2	65.3	225.4
1933	424.3	325.1	129.9	148.7	93.7	141.6	876.3	485.9	115.3	53.3	98.0	95.5	249.1
1934	85.2	93.1	97.8	93.5	38.6	206.5	650.0	331.4	227.6	53.0	40.8	52.4	164.2
1935	87.7	171.7	132.2	170.2	61.4	162.2	349.4	422.7	409.9	186.7	113.2	105.2	198.2
1936	118.3	166.6	84.8	56.8	46.9	651.3	442.3	471.9	91.7	65.4	73.5	177.4	204.6
1937	292.4	176.6	170.2	338.1	178.6	95.0	472.4	757.4	223.2	101.8	139.9	79.3	252.8
1938	187.7	213.6	92.8	133.9	237.9	400.0	433.7	292.1	106.4	179.8	198.7	493.1	246.8
1939	135.5	137.3	216.8	120.2	137.1	190.8	540.7	497.4	164.0	73.3	64.6	49.1	194.0
1940	85.6	72.8	72.6	50.6	42.8	52.2	365.1	873.2	236.9	116.0	65.6	82.6	177.1
1941	85.3	153.1	185.4	128.2	92.5	58.6	553.6	140.6	60.1	81.3	42.5	39.6	134.7
1942	110.8	131.7	128.5	85.4	51.8	174.8	723.2	335.7	247.1	54.3	47.5	201.4	190.7
1943	156.8	199.1	101.6	103.1	123.3	247.3	329.6	858.7	331.8	163.5	213.9	128.9	247.5
1944	168.0	234.7	95.3	89.6	87.9	128.4	490.2	663.6	199.0	101.3	53.6	104.7	201.4
1945	123.1	99.9	76.7	101.8	82.8	616.0	470.2	607.5	153.5	330.1	67.0	329.2	256.1
1946	511.5	263.8	117.2	147.0	83.7	460.9	265.2	407.4	168.4	100.6	71.4	70.7	223.8
1947	287.0	295.2	225.9	170.3	172.5	205.4	732.2	977.5	492.4	397.8	111.7	87.0	347.1
1948	66.6	108.4	78.3	58.7	65.8	442.5	477.5	440.8	184.8	113.0	107.7	55.0	183.7
1949	90.0	312.3	260.8	326.7	160.8	322.8	430.4	302.4	81.6	51.1	84.8	138.1	213.6
1950	113.3	169.0	239.6	301.4	81.3	127.7	455.1	356.2	124.3	50.1	104.4	181.1	192.4
1951	80.2	323.5	275.3	139.2	127.6	284.6	663.7	347.8	130.5	279.8	114.5	123.1	241.0
1952	104.4	291.2	234.2	165.0	122.4	147.6	722.5	390.7	206.7	69.0	91.1	63.8	216.8
1953	88.6	107.1	204.2	173.9	155.6	563.1	534.6	436.0	68.2	55.1	142.0	81.7	218.2
1954	85.4	118.5	198.1	88.8	270.5	246.3	986.9	433.3	277.4	139.3	126.5	397.0	279.0
1955	255.0	250.4	191.8	128.6	108.5	250.0	873.7	295.1	226.5	74.5	126.1	87.7	238.8
1956	209.5	222.8	92.2	69.6	70.7	79.3	545.1	762.4	210.6	87.7	45.1	76.5	206.5
1957	70.8	103.4	124.1	150.4	112.6	142.2	343.9	323.8	199.1	130.2	67.6	74.3	153.6
1958	82.4	180.9	408.5	108.1	71.8	84.3	807.9	361.5	241.7	140.9	100.2	187.0	231.2
1959	190.7	203.3	69.1	132.6	72.0	69.9	736.3	382.5	274.6	87.7	82.1	58.2	196.3
1960	303.8	362.9	231.9	108.9	191.8	139.7	998.7	341.2	149.6	111.7	92.6	91.0	259.2

West Branch Ausable River, near Lake Placid
MEAN DISCHARGE - cubic feet per second
Normal monthly means (all days)

Year	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Annual Mean
1961	144.6	165.8	85.2	58.0	114.7	145.8	366.0	431.1	239.2	172.4	77.4	87.2	174.0
1962	78.1	132.1	122.8	104.9	65.5	103.8	664.1	317.8	87.1	78.5	129.6	150.3	169.4
1963	204.0	191.1	210.6	76.8	62.1	163.6	653.6	452.7	122.2	81.5	220.3	61.5	209.0
1964	56.0	223.1	119.6	93.4	68.9	238.9	502.5	454.7	112.7	93.0	75.1	47.6	173.8
1965	51.2	98.8	102.8	76.9	136.4	59.6	215.9	325.5	102.6	63.7	176.5	140.6	129.0
1966	247.9	238.3	118.0	127.0	130.6	325.4	340.1	473.9	171.8	61.2	92.3	95.0	202.3
1967	97.1	138.6	116.9	94.1	77.6	73.0	521.2	334.1	242.0	86.3	99.9	96.1	164.5
1968	209.9	183.2	149.5	67.0	69.3	264.2	447.5	297.4	143.6	114.7	58.2	66.0	172.7
Statistical Summary, 1920-1968													
Avg.	161.2	196.9	158.5	130.6	106.3	237.5	550.6	458.9	198.1	124.2	99.9	118.1	211.9
Std. Dev.	99.3	94.5	82.6	78.4	56.9	172.9	178.7	184.7	92.9	74.9	45.1	87.9	42.8
Maximum	511.5	553.8	408.5	366.1	285.1	832.3	998.7	977.5	492.4	397.8	220.3	493.1	347.1
Minimum	51.2	72.8	51.4	42.3	22.9	52.2	215.9	108.3	60.1	50.1	37.8	39.6	129.0

Estimated discharge for North Meadow Brook, Mt. Van Hoevenberg, at Pump House

	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Annual Mean
Mean (cfs)	6.4	7.8	6.3	5.2	4.2	9.4	21.8	18.2	7.9	4.9	4.0	4.7	8.4

Appendix J

Vegetation Impacts

PARTIALLY EXISTING CONNECTOR TRAIL "#2"

	Sugar Maple	White Ash	Beech	Red Maple	Hemlock	Basswood	Yellow Birch	White Birch	Black Cherry	Aspen	Balsam Fir	Ironwood	Striped Maple	Red Oak	Red Spruce	Mountain Ash	Hard Maple	
3	4						1						3					
4	2		3				2						2					
5	6		4										2		1			
6	7		1												2			
7																		
8			2															
9																		
10			1															
11																		
12			1															
13																		
14																		
15																		
16																		
17																		
18																		
19			3															
20			4															
21			2															
22			3															
23																		
24																		
25																		
26																		
27																		
28																		

TOTAL: 19 24 3 7 3

GRAND TOTAL: 56

Tree Count for all 32 miles of trail as of 7/12/98:

	Sugar Maple	White Ash	Beech	Red Maple	Hemlock	Basswood	Yellow Birch	White Birch	Black Cherry	Aspen	Balsam Fir	Ironwood	Striped Maple	Red Oak	Red Spruce	Mountain Ash	Hard Maple
3			1								5				1		
4							2			1	7				3		
5	3		1				1				2				5		
6	1										5				2		
7	2								1								
8			3				3			2	3						
9			2								2						
10			5														
11										2	3				1		
12			1								2						
13															2		
14	1							2			3						
15																	
16			3												3		
17	2																
18			1					1									
19									2								
20			2														
21			5								2						
22	3		3												1		
23			5														
24			3				1				1						
25										1							
26																	
27																	
28																	
TOTALS	12		35				7	3	3	6	35				18		

GR[illegible] T[illegible] 119 Tre[illegible]

Reservoir Tree Cutting Needs

P.3

	Sugar Maple	White Ash	Beech	Red Maple	Hemlock	Basswood	Yellow Birch	White Birch	Black Cherry	Aspen	Balsam Fir	Ironwood	Striped Maple	Red Oak	Red Spruce	Mountain Ash	Hard Maple
5								2									
4								1		1					2		
5								1	1	2					3		
6								1							4		
7								1									
8								3									
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
TOTALS								9	1	3	-				9		

JUN 03 '96 11:14 LAKE PLACID, NY

Grand Total = 22

STRAIGHTAWAY @ XC STADIUM

	Sugar Maple	White Ash	Beech	Red Maple	Hemlock	Basswood	Yellow Birch	White Birch	Black Cherry	Aspen	Balsam Fir	Ironwood	Striped Maple	Red Oak	Red Spruce	Mountain Ash	Hard Maple
3															1		
4											1				2		
5											2						
6											3				1		
7											1				2		
8											2				1		
9											1				2		
10							1				2						
11											1						
12																	
13							1										
14											1						
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
TOTALS							2				14				9		

GRAND TOTAL: 25 TREES

TIMING BUILDING RELOCATION

	Sugar Maple	White Ash	Beech	Red Maple	Hemlock	Basswood	Yellow Birch	White Birch	Black Cherry	Aspen	Balsam Fir	Ironwood	Striped Maple	Red Oak	Red Spruce	Mountain Ash	Hard Maple
3											2						
4											2						
5											1						
6											1				1		
7																	
8											1				1		
9																	
10															1		
11																	
12															1		
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20															1		
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
TOTALS											7				5		

GRAND TOTAL: 12 TREES

Appendix K

Conceptual Stormwater Analysis Calculations

Appendix K

Conceptual Stormwater Analysis Calculations

SC-1

	Existing	Proposed
gravel	12.5 ac	8.4 ac
asphalt	3.7 ac	7.7 ac
buildings	.5 ac	.5 ac
meadow	63.3 ac	70.3 ac
woods	1060.3 ac	1053.4 ac
	1140.3 acres	**1140.3 acres**

SC-3

	Existing		Proposed
meadow	9.9 ac	*meadow*	11.87 ac
woods	1127.5 ac	*woods*	1125.53 ac
	1137.4 acres		**1137.4 acres**

Weighted C Calculation

SC-1

Existing

$$\frac{(12.5 \times .85) + (3.7 \times .98) + (.5 \times .98) + (63.3 \times .79) + (1060.3 \times .73)}{1140.3 \text{ Acres}}$$

$$\frac{10.62 + 3.62 + .49 + 50.0 + 774.02}{1140.3} = \frac{838.75}{1140.3}$$

Weighted C for SC-1 Existing ***.735***

Proposed

$$\frac{(8.4 \times .85) + (7.7 \times .98) + (.5 \times .98) + (70.3 \times .79) + (1053.4 \times .73)}{1140.3}$$

$$\frac{7.14 + 7.55 + .49 + 55.54 + 768.98}{1140.3} = \frac{839.7}{1140.3}$$

Weighted C for SC-1 Proposed ***.736***

Weighted C Calculation

SC-3

Existing

$$\frac{(9.9 \times .79) + (1127.5 \times .73)}{1137.4 \text{ Acres}} = \frac{7.82 + 823.07}{1137.4} = \frac{830.89}{1137.4}$$

Weighted C for SC-3 Existing .730

Proposed

$$\frac{(11.87 \times .79) + (1125.53 \times .73)}{1137.4} =$$

$$\frac{9.37 + 821.63}{1137.4} = \frac{831}{1137.4}$$

Weighted C for SC-3 Proposed .730

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