

CHAPTER 7: SOURCES OF POLLUTION

H. SALT STORAGE AND DEICING MATERIALS

SALT SUMMARY

Salt may become an environmental concern depending upon application, mixing or storage practices. There is the potential to threaten the chemical and physical characteristics of a lake, corrode metals and pollute groundwater making well water undrinkable. Salt application practices vary by county, municipality and winter conditions. Counties, municipalities, New York State Department of Transportation (NYSDOT), Seneca Army Depot and other private organizations in the Seneca Lake watershed were asked to complete a survey about salt practices during the 1997-1998 season. Of the fifty identified municipalities and private organizations that might use salt, nine did not reply. The survey identified eighteen storage piles in the watershed. It was learned that two salt piles are exposed and they are located in the Kashong Creek and Sixteen Falls Creek sub-watersheds. Based on survey results, there was 6,985 tons of salt applied to 1,271 road miles in the Seneca Lake watershed during the 1997-1998 season. This averages to 5.5 tons per road mile. Salt applications need to be documented yearly to fully understand application practices in the Seneca Lake watershed.

INTRODUCTION

Deicing salt, commonly known as road salt, is used to help deice road surfaces during the colder months of the year, usually from November through April. In the Seneca Lake watershed, the responsibility for public winter road maintenance falls on the local, county and state highway departments in Chemung, Schuyler, Seneca, Ontario and Yates Counties. Other facilities that apply salt to keep roads clear include the Seneca Army Depot and the Willard Treatment Center. This survey did not address salt application on private roads.

Deicing salt or common rock salt, contains sodium chloride and is the most common type of deicing agent used in the watershed. Generally, salt is applied straight or mixed with sand or some other deicing agent. Application procedures, mixtures and storage vary and depend on municipal policy. For some highway departments, deicing application begins early in a storm to prevent ice build-up, others focus on intersections and steep grades. Deicing is continued to establish a brine solution that breaks the bond between the ice and road surface. Some municipalities make their own mix while others purchase the product pre-mixed. Eighteen salt/mix storage piles are located in the watershed; two are exposed to the elements of nature and the remaining sixteen are covered by a structure.

There are several environmental concerns regarding the use of deicing salts. Salts are water soluble and easily wash off pavement into surface waters and may leach into soil and eventually groundwater. High concentrations of salt can damage and kill vegetation, disrupt fish spawning in streams, reduce oxygen solubility in surface water, interfere with the chemical and physical characteristics of a lake, pollute groundwater making well water undrinkable, disintegrate pavement, and cause metal corrosion of bridges, cars and plumbing. This cause/effect relationship is increased when salt is stored in exposed piles.

SALT PILES

Based on the survey response, there are eighteen salt storage pile sites within the Seneca Lake watershed. Salt storage sites are dependent upon the location of municipal distribution and maintenance facilities.

Two legislative activities related to the control of stormwater runoff from uncovered salt storage piles are currently being discussed. The first is a bill that is on hold in the New York State Legislature that would require that all salt storage piles to be covered. A second source of legislative activity for the control of stormwater runoff from uncovered salt storage piles is the recently adopted federal stormwater management permit regulations. The Environmental Protection Agency has delegated this authority to the NYSDEC. The stormwater management permit regulations are covered under Article 17, Titles 7 & 8, and Article 70 of the Environmental Conservation Law. These regulations indicate that salt storage piles of deicing or other commercial or industrial applications shall be in compliance with these regulations by August 1, 1996.

This regulation covers the eighteen salt pile storage sites in the Seneca Lake watershed. These regulations became effective as of February 1, 1994, and it will be the responsibility of the NYSDEC to determine the applicability of these regulations to salt storage piles in the watershed.

During the spring of 1998, Seneca Lake Area Partners mailed a survey, using the Dillman method (*Dillman, 1976*) to local and state highway departments and private organizations regarding deicing salt usage and storage. The response and cooperation by the departments was excellent. Of the fifty identified municipalities and private organizations, 41 returned the survey.

METHODS

Municipalities were asked to provide information on total mileage maintained during the winter and total amount of salt in tons used for the 1997-98 season. From this, salt application rates were calculated in tons/mile/year so rates could be *compared* (*See Table 7H.1. and Table 7H.2*). Application rates do not take into account the terrain in the municipalities, varying snowfall amounts or different salt to sand mixes used. These considerations could account for some variations in application rates.

Municipals were also asked for the locations of salt/mix piles and if they are exposed or covered. Policies and procedures used by the different municipalities and the NYSDOT were also surveyed (*Table 7H.3. and Figure 7H.1.*).

The tons of salt per mile of road maintained was determined by dividing the road miles maintained for the municipality by total salt applied for the 1997-1998 season (*See Table 7H.1*).

To identify the potential risk of pollution from deicing salt practices in the Seneca Lake

watershed, deicing salt storage and usage was estimated by sub-watershed and the results are presented in Table 7H.2. Using the NYS Department of Transportation, Mapping Services Bureau database, the miles of public roads maintained by municipality was calculated for each sub-watershed. By multiplying sub-watershed road mileage by salt application rate, the total salt contribution of each municipality was estimated for each sub-watershed. By summing the contributions of all departments and organizations applying salt within the sub-watershed, a total salt load was calculated. The percentage that each sub-watershed contributes to the total applied to the watershed was calculated by dividing the total salt applied by the total road mileage maintained (*See Table 7H.2*). The location of exposed salt/mix storage piles in the watershed were also located by sub-watershed to determine pollution risk.

Table 7H.1. Deicing salt information for the 1996-97 Winter Season in the Seneca Lake Watershed.

Municipality or Agency	Reported Miles of Road Maintained	Road Miles in Watershed	Yearly Reported Tons Salt Used	Tons Salt per Mile of Road Maintained	Salt Storage Pile in Watershed
CHEMUNG CO					
Town of Catlin	58.17	19.75	700	12.03	N
County Highway ²		27.49			
Town of Horseheads	58.00	5.89	1000	17.24	Y
Town of Veteran ¹	54.00	29.51	30	0.56	Y
NYS DOT	725.00	7.91	3000	4.14	N
SCHUYLER CO					
Town of Catharine ²		27.71			
Town of Cayuta	21	0.94	90	4.29	N
County Highway	122	78.85	1200	9.83	Y
Town of Dix	56	51.67	300	5.81	Y
Town of Hector ³	127	89.58	60	0.47	Y
Town of Montour	25	22.06	120	4.80	Y
NYS DOT ¹⁰	225lm	69.76	3250	14.44	Y
Town of Orange	67	12.32	1	0.015	N
Town of Reading	42	42.44	278	6.61	Y
Town of Tyrone	84	28.23	100	1.19	?
Vill. of Odessa ²		6.33			
Vill. of Watkins Glen	13.8	13.92	175	12.68	County
Vill. of Montour Falls	3.5	14.56	100	28.57	Montour
SENECA CO					
County Highway	250	38.86	2500	10.0	Y
Town of Fayette ²		8.46			
Town of Lodi ⁴	42	41.13	35	0.83	Y(open)
NYS DOT ¹⁰	172lm	35.19	2600	7.56	N
Seneca Army Depot ²					
Town of Ovid ⁵	45	17.95	60	1.33	N
Town of Romulus	26	9.84	500	19.23	?
Town of Varick	22	5.09	28	1.27	?
Town of Waterloo	26	4.97	300	11.54	N
Willard Trt. Center	8		186	23.25	Y
ONTARIO CO					
County Highway ²		19.36			
City of Geneva ^{2,6}		44.52			
Town of Geneva	37	24.07	548	14.81	Y
Town of Gorham ⁷	90	0.47	1200	13.33	N
NYS DOT ¹⁰	325lm	21.10	5177	7.96	N
Town of Phelps	118	1.31	300-700 #/mile	0.15 – 0.35 T/mile	?
Town of Seneca	86	51.07	700	8.14	N

Municipality or Agency	Total Road Mileage Maintained	Mileage within Watershed	Total Tons Salt Used	Tons per Mile of Road Maintained	Storage Pile in Watershed
YATES CO					
Town of Barrington ⁸	74.50	34.17	185	2.48	
Town of Benton	50	44.08	170	3.40	Y(open)
County Highway ²		104.17			
Town of Jerusalem ⁸	109	2.06	550	5.04	N
Town of Milo ⁹		42.89			?
NYS DOT ¹⁰	199lm	59.06	3250	16.33	Y
Town of Potter ⁸	48.80	1.66	360	7.38	N
Town of Starkey	70	57.30	300	4.29	Y
Town of Torrey	50	33.36	150	3.00	Y
Village of Dresden	4.18	3.21	9	2.15	Torrey
Village of Dundee	8.14	8.14	132	16.21	Y
Village of Penn Yan ²		16.96			

¹ Includes Village of Millport

² No Response

³ Includes the Village of Burdett

⁴ includes Village of Lodi

⁵ Includes Village of Ovid

⁶ Includes Seneca County portion

⁷ Taken from Canandaigua Lake Book

⁸ Taken from Keuka Lake Book

⁹ Survey Response indicates no salting of roads in town

¹⁰ Assumes all NYSDOT roads are two lanes

Table 7H.2. Deicing Salt Use and Storage Piles by Seneca Lake Sub-watersheds and Direct Drainages.

Subwatershed	Road Miles Salted		Salt Applied 1996-97		Salt/Mile Tons	Exposed Salt/Mix Storage Piles
	Miles	Percent	Tons	Percent		
Catharine Creek	351.85	27.69	2477.29	35.46	7.04	N
Reading DD	58.40	4.59	496.64	7.11	8.50	N
Rock Stream	22.15	1.74	126.20	1.81	5.70	N
Big Stream	109.78	8.64	591.75	8.47	5.39	N
Starkey DD	60.14	4.73	256.57	3.70	4.24	N
Plum Point Creek	11.33	0.89	1.14	0.02	0.10	N
Long Point DD	34.05	2.67	130.75	1.87	3.84	N
Keuka Lake Outlet	110.18	8.67	386.57	5.53	3.51	N
Benton DD	26.12	2.05	129.82	1.86	4.97	N
Kashong Creek	71.01	5.58	279.73	4.0	3.99	Y
Reed Point DD	21.70	1.71	201.24	2.88	9.27	N
Wilson Creek	41.48	3.26	293.47	4.20	7.07	N
Geneva DD	96.13	7.56	429.30	6.14	4.46	N
Sunset Bay DD	22.01	1.73	27.94	0.39	5.81	N
Reeder Creek	2.44	0.19	3.09	0.04	1.27	N
Wilcox Creek	7.36	0.57	41.99	0.60	5.71	N
Kendaia Creek	3.87	0.30	49.47	0.71	12.78	N
Sampson State Park DD	4.17	0.33	15.58	0.22	3.74	N
Indian Creek	14.94	1.17	195.14	2.79	13.12	N
Simpson Creek	14.22	1.12	97.82	1.40	6.88	N
Sixteen Falls Creek DD	29.32	2.30	112.25	1.60	3.80	Y
Lodi Point	5.59	0.43	30.61	0.44	5.59	N
Mill Creek	22.61	1.77	81.97	1.17	3.63	N
Lamoreaux Landing DD	24.03	1.89	93.23	1.33	3.87	N
Valois DD	25.16	1.98	106.87	1.52	4.24	N
Sawmill/Bullhorn Creek	10.13	0.79	35.10	0.50	3.46	N
Satterly Hill DD	19.68	1.54	100.71	1.44	5.12	N
Glen Eldridge	13.60	1.07	46.90	0.67	3.44	N
Hector Falls Creek	37.13	2.92	146.29	2.09	3.94	N
TOTAL:	1270.58	100	6985.43	100	154.48	

RESULTS

Based on individual survey response from the municipalities, salt application per road mile maintained ranged from 0.35 to 19.23 tons for the season (Table 7H-1). Not all municipalities participated in the survey. Those that did not respond are footnoted. Based on NYSDOT data, there are 1270.58 road miles in the Seneca lake watershed. This number includes local, county and state roads. Table 7H-2 summarizes the municipal road miles the percent of road miles by sub-watershed. Based on the survey results for the 1997-1998 season, total salt applied was 6985.43 tons. The tons of salt applied per road mile by sub-watershed ranged from 0.10 to 13.12 tons. The total salt applied per mile in the Seneca Lake watershed for 1997-1998 season was 154.48 tons. The average value of salt applied through out the watershed is 5.49 tons per road mile.

For ranking purposes, the sub-watershed data are compiled in Table 7H-4 showing which have HIGH< MODERATE< or LOW application rates and which contribute HIGH< MODERATE< or LOW amounts of salt to the watershed. Figure 7H.2. shows sub-watersheds ranked for total salt application and Figure 7H.3. shows sub-watersheds ranked for total salt contribution. Figure 7H.4. displays the overall ranking. The presence of exposed salt/mix storage pile(s) were also a consideration in ranking. (*See Figure 7H.1.*) These three criteria were used to determine an overall ranking for each of the sub-watersheds for Seneca Lake.

This study suggests that the Big Stream, Catharine Creek, Geneva Direct Drainage (DD), Kashong Creek, Indian Creek, Reading DD, and Reed Point DD are relatively HIGH contributors of deicing salt to Seneca Lake. Kashong Creek, Keuka Lake Outlet, Lodi Point DD, Rock Stream, Simpson Creek, Starkey DD, Sunset Bay DD, Wilcox Creek and Wilson Creek are MODERATE contributors of deicing salt to Seneca Lake. Benton DD, Glen Eldridge, Hector Falls Creek, Lamoreaus Landing DD, Long Point DD, Mill Creek, Plum Point, Reeder Creek, Sampson State Park DD, Satterly Hill DD, Sawmill/Bullhorn Creek, Sixteen Falls Creek and Valois DD are LOW contributors of deicing salt to Seneca Lake.

Table 7H.3. Salt Survey Responses by Municipalities in the Seneca Lake Watershed.

	<i>T. Bar- rington</i>	<i>T. Benton</i>	<i>T. Cath- arine</i>	<i>T. Catlin</i>	<i>T. Dix</i>	<i>V. Dresden</i>	<i>V. Dundee</i>	<i>C. Geneva</i>	<i>T. Hector</i>	<i>T. Horse- heads</i>	<i>T. Lodi</i>	<i>T. Milo</i>
Superintendent	Steve Wheeler	Bruce Moore-house	Larry Reynolds	Alvin Janowski	William J. Bannister	John M. Stryker	Stewart Howell	David Achilles	Arnold Grover	Kenneth Coolbaugh	Robert Sibley	Bruce Fullager
Deicing Material		Salt & Sand		Salt, Sand/ Cinders Mix	Salt & Sand	Salt & Sand	Salt, Cinders & CaCl	Salt & Sand	Salt & Sand	Salt & Cinders	Salt & Sand	Salt & Sand
Record of Annual Use		170 tons		700 tons	300 tons	45 tons	132 tons	580 tons	60 tons	1000 tons	38 tons	
Record of Salt per mile				700 lbs/ mile		2,250 lbs/mile	1.5 yds/mile	800 lbs/ mile		variable		variable
Application Mix Ratio		1 salt/ 7 sand		1 salt/ 4 sand/ci- nders	1 salt/ 4 sand	1 salt/4 sand	1 salt/5 cinders	1 salt / 1 sand	1 salt/ 4 sand	1 salt / 4 cinders	1 salt / 10 sand	
Miles Maintained		40 paved 10 dirt		51 paved 7.5 dirt	38 paved 14 dirt	4.18 paved	6.65 paved	37 paved	24 paved 100 dirt	60 paved	24 paved 14 dirt	8 paved (county)
Salt Storage Location	Town Barns Old Bath Rd.	Havens Corners Rd		1471 Chamber Rd.	2305 County Rt 17	Route 14/by City Hill Road	Spring Street	32 White Springs Rd	5097 State Rt 227 Burdett	150 Wygant Rd	8491 Mill St.	
Exposed ?	No	Yes		No	No	Yes	No	No	Yes	No	Yes	
Policies for Rate of Application		Road Conditions		Weather Conditions	Weather Conditions	Weather Conditions	Road Conditions	Road Conditions	Severity of Ice Only	Tempera- ture	Road Conditions	Road Conditions

Table 7H.3. Salt Survey Responses by Municipalities in the Seneca Lake Watershed. -continued

	T. Montour	T. Orange	T. Ovid	T. Phelps	T. Reading	T. Romulus	T. Seneca	T. Starkey	T. Torrey	T. Tyrone	T. Varick	T. Veteran
Superintendent	Lester Cady	Jack Scranton	John Wickham	Norman Teed	Harold Rappleye	William Ritchie	Melvin Sloth	Jack Cornish	Jim Covell	Paul Ernhout	Richard McCulloch	Robert Smith
Deicing Material	Salt & Sand	Calcium Chloride, Salt&Sand	Salt & Sand	Salt, & Magic	Salt & Sand	Salt & Sand	Salt & Sand	Salt & Sand	Salt & Sand	Salt, Sand & Cinders	Salt & Sand	Salt, Sand & Cinders
Record of Annual Use	120 tons	1 ton	60 tons		551 tons	500 tons	700 tons	300 tons		100 tons	28 tons	30 tons
Record of Salt per mile				700lbs-paved 300lbs-dirt			400 lbs/mile					
Application Mix Ratio	1 salt/ 10 sand	1 salt/ 10 sand	1 salt/ 5 sand	1 ton salt/ 6 gallons Magic	50% salt-paved, 25% salt-dirt		1 salt/ 2 sand	1 salt/ 5.25 sand	1 salt/ 4 sand	25% salt-paved, 15% salt-dirt	1 salt/ 6 sand	1 salt/ 99 cinder
Miles Maintained	14 paved 11 dirt	3 paved 64 dirt	45 paved 1 dirt	116 paved 2 dirt	15 paved 21 dirt	26 paved	70 paved 16 dirt	35 paved 35 dirt	46 paved 4 dirt	49 paved 35 dirt	17 paved 5 dirt	23 paved 31 dirt
Salt Storage Location	Rt 14 Montour	Outside Watershed	Center Rd & Co. Rd. 129	Outside Watershed	3951 Rt. 14A Reading	6804 Co. Rd 129	3649 Flint Rd Stanley	656 Dundee-Glenora Rd	Rt 14 Dresden	3602 Cemetery Rd		1011 Ridge Rd
Exposed ?	No	Yes	Yes		No	No	Yes	No	Yes	No	Yes	No
Policies for Rate of Application	Weather Conditions	Road Conditions	Public Safety/ Weather	Road Conditions	Weather Conditions	Weather Conditions	Weather Conditions	Public Concern/ Weather	Weather Conditions	Weather Conditions	Necessity at Intersections	Varies

Table 7H.3. Salt Survey Responses by Municipalities in the Seneca Lake Watershed. -continued

Item	V. Water- loo	NYS DOT Chemung	NYS DOT Ontario	NYS DOT Seneca	NYS DOT Schuyler/ Yates	Schuyler County	Seneca County	V. Montour Falls	V. Watkins Glen	Willard Treatment Center
Superintendent	Rudy Bartino	Kevin B. O'Buckley, P.E.	Merton J. Edwards, P.E.	R. Gervel	Gerald N. Kernahan, R.E.	Greg Mathews	Holger Karlsen	Richard Murphy	James Colunio	John Rafferty
Deicing Material	Salt & Sand	Salt & Magic*	Salt, Salt & Sand	Salt, CaCl	Salt, MgCl	Salt & Sand	Salt, Sand & Stone Dust	Salt, Salt & Sand	Salt	Salt
Record of Annual Use	300 tons	3000 tons	5177 tons	2600 tons	6500 tons	1200 tons	2500 tons	100 tons	175 tons	186 tons
Record of Salt per mile		75-300 lbs/ lane mile	225 lbs/ lane mile	225 lbs/ lane mile	225 lbs/ lane mile		400-500 lbs/mile			
Application Mix Ratio	3 salt/ 2 sand	100% salt OR 19 salt/ 1 Magic	100% salt OR salt/ sand mix		100% salt OR 100% sand(occasionally)	1 Salt/1 Sand	1 salt/ 9 Stone Dust		100 % Salt	100% salt
Miles Maintained	26 paved	725 paved	325 lane miles paved	172 lane miles paved	424 paved Schuyler & Yates	122 paved	250 paved	3.5 paved	13.8 paved	8 paved
Salt Storage Location	Not in Watershed	Outside Watershed	Outside Watershed	Outside Watershed	Yates – Route 14A, 1 mile S of Penn Yan Schuyler – Corner Route 414, Co Rte. 16		2017 Prospect Street	Cook Street		Treatment Campus/7116 County Road
Exposed ?	No	No	No	Yes	Yes	Yes	No	Yes	No	
Policies for Rate of Application	Weather Conditions	Federal Guidelines	Weather Conditions	Pro-Active	Weather Conditons		Road Conditions	Necessity at Intersections	Weather Conditions	

*Waste product from Brewing and Magnesium Chloride

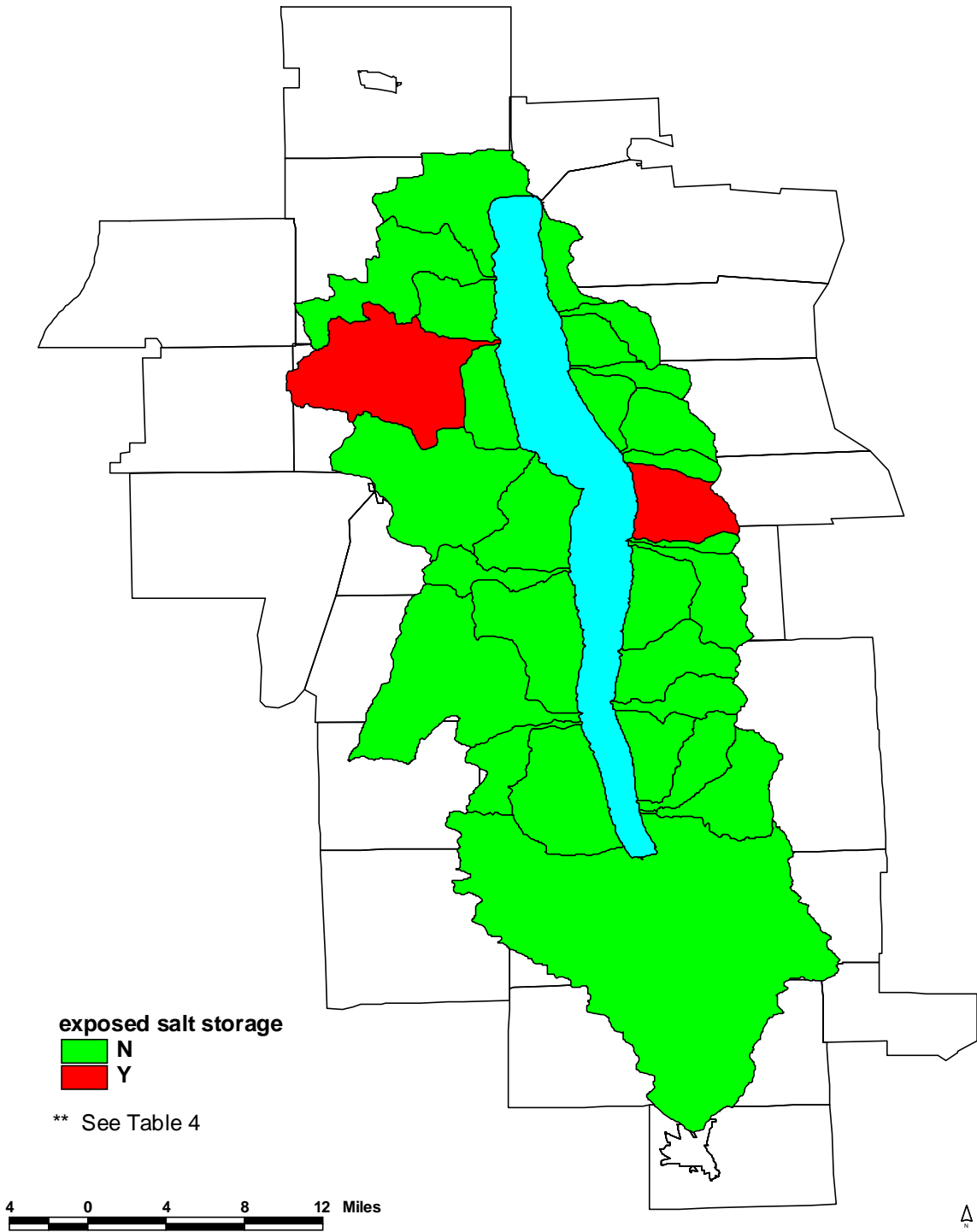
Table 7H-4. Sub-watershed and Direct Drainage Ranking for Deicing Salt Use and Storage for Winter 1997-1998.

Seneca Lake Subwatershed	Salt Application Rate in Tons/Mile/Year ¹			Total Salt Contribution in Tons/Year ²			Exposed Storage Piles	Overall Rank
	High >7.33	Mod 7.33-5.39	Low <5.39	High >400	Mod 400-208	Low <208		
Indian Creek	X					X	N	H
Kendaia DD	X					X	N	H
Big Stream		X		X			N	H
Catharine Creek		X		X			N	H
Geneva DD			X	X			N	H
Reading DD	X			X			N	H
Reed Point DD	X					X	N	H
Starkey DD			X		X		N	M
Sunset Bay DD		X				X	N	M
Wilcox Creek DD		X				X	N	M
Wilson Creek		X			X		N	M
Kashong Creek			X		X		Y(1)	M
Keuka Lake Outlet			X		X		N	M
Lodi Point DD		X				X	N	M
Rock Stream		X				X	N	M
Simpson Creek		X				X	N	M
Glen Eldridge			X			X	N	L
Hector Falls Creek			X			X	N	L
Benton DD			X			X	N	L
Lamoreaux Landing DD			X			X	N	L
Long Point DD			X			X	N	L
Mill Creek			X			X	N	L
Plum Point Creek			X			X	N	L
Reeder Creek			X			X	N	L
Sampson State Park DD			X			X	N	L
Satterly Hill DD			X			X	N	L
Sawmill/Bullhorn Creek			X			X	N	L
Sixteen Falls Creek			X			X	Y(1)	L
Valois DD			X			X	N	L

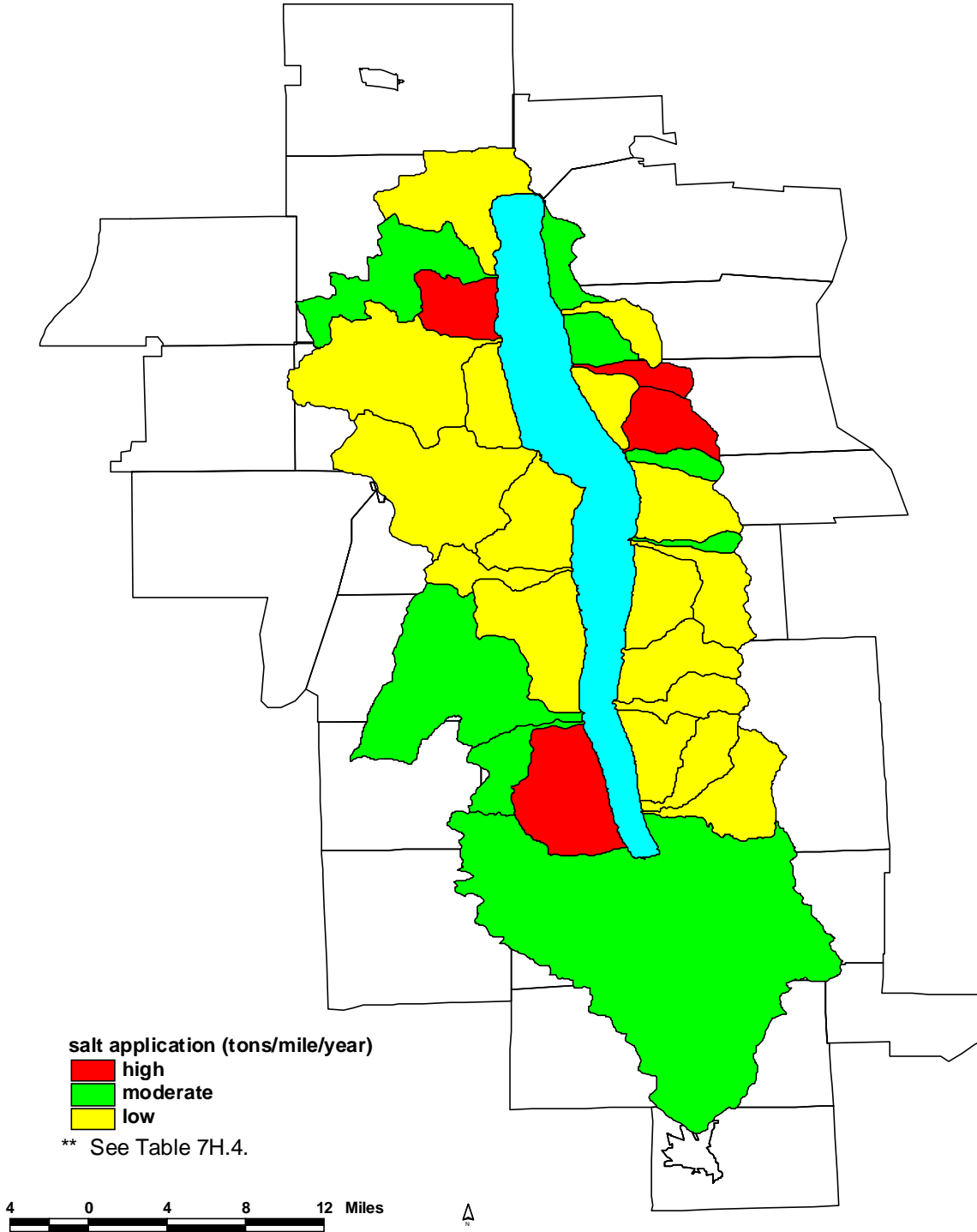
¹ Deleting Salt/mile values of 12.78,13.12, 1.27 and 0.10; rank determined by (9.27-3.44)/3

² Deleting Salt applied values of 2477.29, 1.14 and 3.09; rank determined by (591.75-15.58)/3

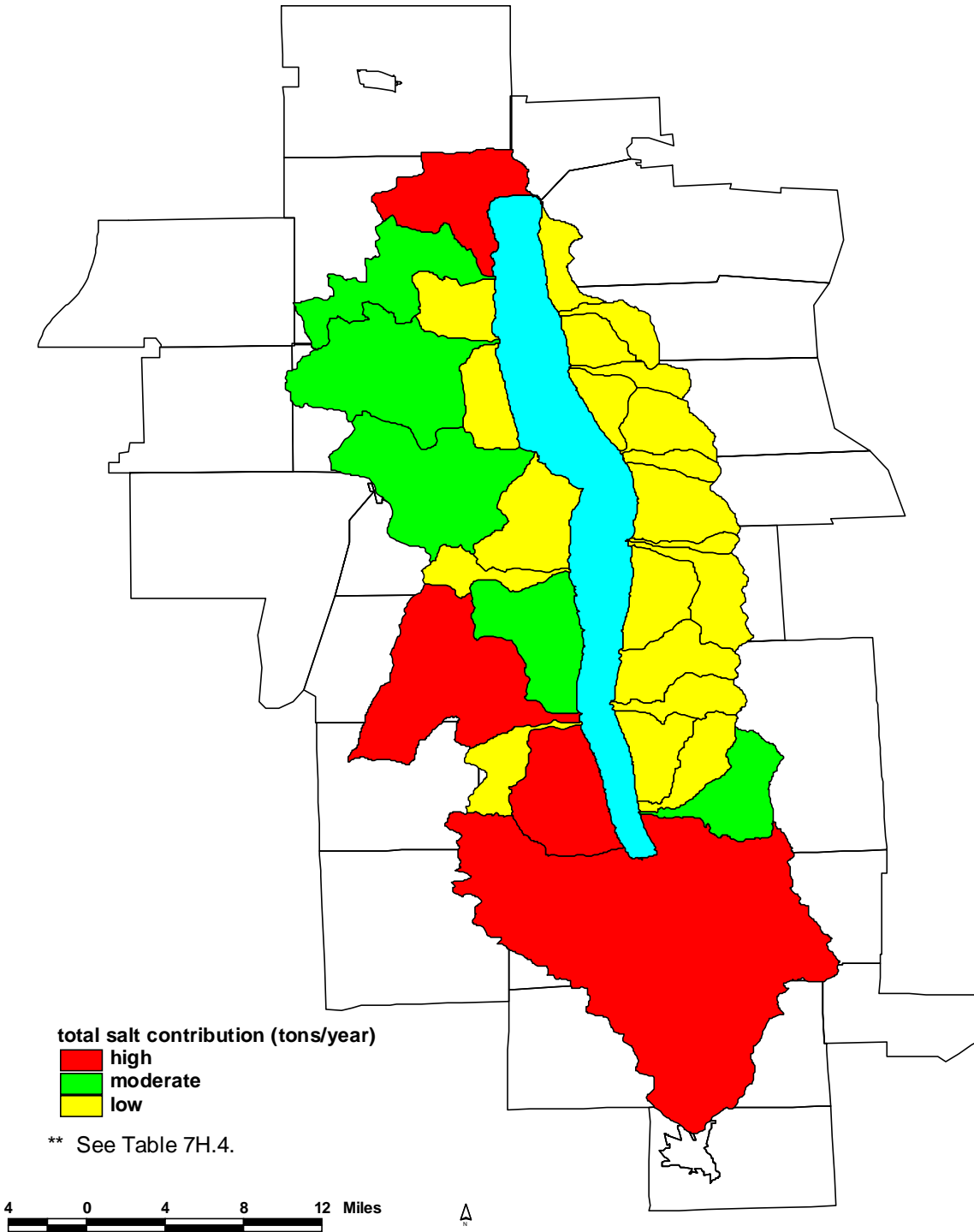
Potential Pollution Problems By Sub-Watershed Exposed Salt Storage Facilities



**Potential Pollution Problems By Sub-Watershed
Salt Application Rate - Tons/Mile/Year**



Potential Pollution Problems By Sub-Watershed Total Salt Contribution - Tons/Year



Potential Pollution Problems By Sub-Watershed Deicing Salt - Overall Rank

