



Town of Carthage

Board of Commissioners

Regular Meeting

January 16, 2024 at 6:30 p.m.

McDonald Building
207 McReynolds Street
Carthage, NC 28327

AGENDA

CALL TO ORDER

INVOCATION – Mayor Jimmy Chalflinch

PLEDGE OF ALLEGIANCE – Commissioner Brent Tanner

APPROVAL OF AGENDA

Members of the board may remove, add, or rearrange items on the agenda prior to commencing the meeting. Motions/votes are not required to approve the agenda but there must be unanimous consent before proceeding.

PUBLIC COMMENT SESSION

Members of the public may use this time to address the Board of Commissioners with any presentations, questions, or concerns. Please fill out the sign-up sheet in the building's entryway to be recognized during the public comment session. All public comments made as part of a public hearing should be withheld until the public hearing has begun and the floor is given to public comments. No public comment will be made outside of this public comment session or a public hearing unless otherwise permitted by the Board of Commissioners. To request to speak outside of the public comment session or public hearing please raise your hand and wait to be recognized by the presiding officer. The mayor or presiding officer may place time limits on speakers prior to the start of the public comment session.

REPORTS

Manager's Report (Emily Yopp, pg. 1)

Departmental Reports (pg. 2-6)

PUBLIC HEARINGS

- a. Continued Public Hearing (#BOA.23.09) – Special Use Permit Application for Use as a Crematorium, Requested by Robert Nunnaley with Fry & Prickett Funeral Home (Jennifer Hunt, pg. 7-52)

NEW BUSINESS

- a. Phase 2 Sewer Improvements Funding Alternatives Summary, (Emily Yopp/Allen Smith, pg. 53-56)
- b. Revisit Strategic Planning Goals, (Jamie Sandoval, pg. 57-69)
- c. Approval of Surplus Items From Public Works Department, (Allen Smith, pg. 70)
- d. Set Interview Date for Planning Board Applicants, (Kim Gibson, pg. 71-75)

OLD BUSINESS

- a. Consideration of Minimum Housing Code Enforcement Ordinance (ORD.24.01); 202 W. Barrett St., (Emily Yopp, pg. 76-79)

FINAL COMMENTS

The Board of Commissioners may take this opportunity to provide feedback, comments, commendations, and/or just general thoughts regarding various topics, issues, and ideas.

CLOSED SESSION

As allowed by NC General Statute § 143-318.11(a)(3)

To consult with an attorney; to protect the attorney-client privilege.

ADJOURNMENT

Town of Carthage

North Carolina

BOARD OF COMMISSIONERS



MEETING AGENDA & BOARD MATERIALS

Regular Monthly Meeting

January 16, 2024

The McDonald Building
207 McReynolds Street
Carthage, NC 28327



MANAGER'S REPORT

Date: January 16, 2024
To: The Board of Commissioners
From: Emily D. Yopp, Town Manager

1. Budget "Kickoff" Begins for Staff

Budget season begins in earnest for the Board of Commissioners from March through June but for staff, we start planning internally for the upcoming budget long before then. This year, we are kicking things off with an internal budget discussion to go over each department's anticipated needs but with a focus on planning for the future. Our first meeting is tomorrow, January 17th, and I am looking forward to this collaborative effort so that we may bring the Board and community a great budget for FY 2024-2025.

2. UDO Discussions Initiated

Jennifer Hunt (Town Planner), Jamie Sandoval (Management Analyst) and myself have also begun discussions with Kimley-Horn for the first phase of the Unified Development Ordinance (UDO) re-write. Discussions are in the very early stages right now but I will be bringing updates to you as things progress.

3. NCLM State and Town Dinner

This year's State and Town Dinner will be hosted in various municipalities across the state. Pinehurst will be hosting one of the dinners in Pinehurst on March 27th. If any members of the Board wish to go please let Kim know and she will RSVP for you.

4. Sluss-Tiller Team Looking for New Ideas

The US Army Civil Affairs Sluss-Tiller course is seeking new ideas in neighboring communities for the 2024 round. Are there any new ideas the Board would like to recommend? So far, we have the following:

- Utilization of clean energy (solar, water, wind power) to increase resiliency.
- Recommendations for progressing with the Carthage Bicycle and Pedestrian plan and implementing trails throughout town.

Respectfully submitted,
Emily Yopp, Town Manager

Carthage Fire Department

Carthage, NC

This report was generated on 1/11/2024 3:44:22 PM



Incident Statistics

Zone(s): All Zones | Start Date: 12/01/2023 | End Date: 12/31/2023

INCIDENT COUNT			
INCIDENT TYPE		# INCIDENTS	
EMS		58	
FIRE		39	
TOTAL		97	
TOTAL TRANSPORTS (N2 and N3)			
APPARATUS	# of APPARATUS TRANSPORTS	# of PATIENT TRANSPORTS	TOTAL # of PATIENT CONTACTS
TOTAL			
PRE-INCIDENT VALUE		LOSSES	
\$0.00		\$0.00	
CO CHECKS			
TOTAL			
MUTUAL AID			
Aid Type		Total	
Aid Given		8	
Aid Received		4	
OVERLAPPING CALLS			
# OVERLAPPING		% OVERLAPPING	
23		23.71	
LIGHTS AND SIREN - AVERAGE RESPONSE TIME (Dispatch to Arrival)			
Station	EMS	FIRE	
Carthage Fire & Rescue	0:08:15	0:07:59	
Cypress Pointe (22)	0:08:20		
AVERAGE FOR ALL CALLS		0:07:51	
LIGHTS AND SIREN - AVERAGE TURNOUT TIME (Dispatch to Enroute)			
Station	EMS	FIRE	
Carthage Fire & Rescue	0:02:42	0:02:01	
Cypress Pointe (22)	0:02:08		
AVERAGE FOR ALL CALLS		0:02:13	
AGENCY		AVERAGE TIME ON SCENE (MM:SS)	
Carthage Fire Department		30:37	

Only Reviewed Incidents included. EMS for Incident counts includes only 300 to 399 Incident Types. All other incident types are counted as FIRE. CO Checks only includes Incident Types: 424, 736 and 734. # Apparatus Transports = # of incidents where apparatus transported. # Patient Transports = All patients transported by EMS. # Patient Contacts = # of PCR contacted by apparatus. This report now returns both NEMSIS 2 & 3 data as appropriate. For overlapping calls that span over multiple days, total per month will not equal Total count for year.

Carthage Police Department | Citation / Warning (NC)s: 18 Results | 2023-12-01 - 2023-12-31

Citation/Warning Type	Citation Date/Time	Agency Case Number	Race	Gender
Written Warning	2023-12-22 20:12	23-009414	W - White	M - Male
Written Warning	2023-12-22 20:21	23-009415	W - White	F - Female
Written Warning	2023-12-21 18:06	23-009404	W - White	F - Female
Written Warning	2023-12-26 15:36	23-009478	W - White	M - Male
Written Warning	2023-12-21 08:34	23-009397	W - White	M - Male
Written Warning	2023-12-12 10:20	23-009266		F - Female
Written Warning	2023-12-12 10:23	23-009266	W - White	M - Male
Citation	2023-12-11 19:28		W - White	M - Male
Written Warning	2023-12-04 19:45	23-009117	W - White	F - Female
Written Warning	2023-12-05 15:11	23-009137	W - White	M - Male
Written Warning	2023-12-04 14:03	23-009110	W - White	F - Female
Citation	2023-12-04 21:20	23-009119	B - Black or African American	M - Male
Written Warning	2023-12-03 14:41	23-009085	B - Black or African American	M - Male
Written Warning	2023-12-01 22:59	23-009042	W - White	M - Male
Written Warning	2023-12-03 21:33	23-009093		F - Female
Written Warning	2023-12-03 20:49	23-009092		M - Male
Written Warning	2023-12-02 21:39	23-009072		M - Male
Written Warning	2023-12-01 20:44	23-009052	W - White	F - Female

Carthage Police Department | Incident (NC)s: 28 Results | 2023-12-01 - 2023-12-31

Incident Number	Reference #	Primary Offense
I20231230-07	23-009537	90Z-02 90Z - Unattended Death Natural Causes
I20231230-05	23-009535	90Z-24 90Z - Trespassing undefined
I20231230-01	23-009530	90Z-05 90Z - Hit & Run Hit & Run Leave Scene Property Damage
I20231229-09	23-009525	90Z-59 90Z - Fraud Bank Account Fraud
I20231227-11	23-009408	90J 90J - Trespass of Real Property undefined
I20231225-01	23-009449	90Z-05 90Z - Hit & Run
I20231222-03	23-009409	90Z 90Z - All Other Offenses Warrant Service
I20231218-24	23-009356	90Z 90Z - All Other Offenses Warrant Service
I20231218-01	23-009349	90Z-03 90Z - Missing Person Missing Persons
I20231216-03	23-009310	90Z 90Z - All Other Offenses Larceny by Employee
I20231215-09	23-009308	90Z 90Z - All Other Offenses Warrant Service
I20231214-24	23-009294	90Z-55 90Z - Pass Counterfeit Money \$100 bill
I20231214-10	23-009291	90Z 90Z - All Other Offenses Altercation
I20231213-25	23-009286	90Z-55 90Z - Pass Counterfeit Money \$100.00 Bill
I20231213-23	23-009286	90Z-55 90Z - Pass Counterfeit Money \$100.00 Bill US Currency
I20231213-01	23-009273	90Z 90Z - All Other Offenses Traffic Crash - Fatal
I20231212-02	23-009254	90D 90D - Driving Under the Influence undefined
I20231211-09	23-009252	26F 26F - Identity Theft undefined
I20231209-04	23-009223	90Z 90Z - All Other Offenses Indecent Exposure
I20231209-01	23-009207	90Z 90Z - All Other Offenses IVC
I20231207-11	23-009160	23C 23C - Shoplifting undefined
I20231207-05	23-009152	90Z-02 90Z - Unattended Death Natural Death
I20231206-18	23-009165	90Z 90Z - All Other Offenses Shooting into an Occupied Dwelling
I20231204-11	23-009119	35A 35A - Drug/Narcotic Violations undefined
I20231202-13	23-009069	220 220 - Burglary/Breaking & Entering undefined

Warrants Served - 7 Results | 2023-12-01 - 2023-12-31

Carthage Police Department

Incident	Warrant Type	Arrest Date	U C R / N I B R S Offenses	Race	Gender	Obtained Location (F I P S)	Offense Date/ Time
I20231202-01	Misdemeanor Warrant	2023-12-02T07:39:00.000Z	13B - Simple Assault	W - White	M - Male	125 - Moore	2023-12-02 00:00
I20231212-02	Misdemeanor Warrant	2023-12-12T00:28:00.000Z	90D - Driving Under the Influence	W - White	M - Male	125 - Moore	2023-12-11 19:28
I20231222-03	Misdemeanor Warrant	2023-12-22T15:32:00.000Z	90Z - All Other Offenses	W - White	F - Female	125 - Moore	2023-12-06 09:00
I20231222-03	Misdemeanor Warrant	2023-12-22T15:32:00.000Z	90Z - All Other Offenses	W - White	F - Female	125 - Moore	2023-12-13 09:00
I20231215-09	Capias Warrant	2023-12-15T18:18:44.101Z	90Z - All Other Offenses	B - Black or African American	M - Male	125 - Moore	2023-12-13 00:00
I20231209-04	Misdemeanor Warrant	2023-12-10T06:53:00.000Z	90Z - All Other Offenses	W - White	M - Male	125 - Moore	2023-12-09 20:07
I20231218-24	Misdemeanor Warrant	2023-12-19T00:06:00.000Z	90Z-24 - Trespassing	W - White	F - Female	125 - Moore	2023-12-18 18:13



Town of Carthage Public Works Department

MONTHLY REPORT DECEMBER 2023

Water Service

Locates	Work Orders	Cut-Offs / Tags	Meters Installed	Water Main/ Service Repairs	Water Taps
140	29		10	1	1

Sewer Service

Service Renewals	Lift Station Repairs	Force Main Repairs	Mowed Outfall Lines	Town Sewer Backups	Sewer Taps
2	2	0	0	2	1

Building & Grounds

Leaf & Limb Total Rounds	Trash Runs	Complete Mowed Rounds	Building Repairs
1			

Streets

Cleaned Out Catch Basin	Cleaned Streets With Blower
1	

Construction Projects

- 1.
- 2.
- 3.

Additional Notes



MEMORANDUM

Date: December 18, 2023/Updated January 11, 2024

To: Board of Commissioners

From: Jennifer Hunt, Town Planner

Subject: SUP-01-23: Special Use Permit for Fry's & Prickett's Funeral Home located at 402 E. Saunders Street, PARID 00002367, Zone R-20; Petitioner: Robert Nunnaley

I. SUMMARY OF APPLICATION REQUEST:

The applicant and owner of Fry & Prickett Funeral Home, Robert Nunnaley, is requesting a Special Use Permit to add a crematory to an existing building where his funeral home is located. The funeral home is currently in the R-20 "Residential" zoning district. The applicant is also proposing to enclose the brick walls to add for storage and parking, adjacent to the main building for the funeral home.

Mr. Nunnaley called Jennifer Hunt the Town Planner on Friday, November 3, 2023, and asked to postpone the public hearing until the December 18, 2023 Board of Commissioner meeting. Ms. Hunt did not present the information to the Planning Board due to the request from Mr. Nunnaley to postpone the public hearing until next month. Nevertheless, here is the information that was in the agenda for Planning Board and the information for the public.

II. PROJECT INFORMATION:

1. PARID: 00002367 PIN: 857707695506
2. Applicant & Owner: Robert Nunnaley
402 E. Saunders Street
Carthage, NC 28327
Robert@PinesFunerals.com
3. Long-Range Plan Designation:
This future area of this land appears to be commercial, per the adopted 2040 Land Use Plan.
4. Current Zoning:
The current zoning is RA-20. The R-20 district is primarily designed to accommodate single family dwellings at lower densities of approximately two units per acre.
5. Application Review Dates:
 - i. Application submitted: September 15, 2023
 - ii. Application complete (per UDO Section 100.38-4): October 26, 2023
 - iii. Planning Board Meeting: December 12, 2023
 - iv. Board of Commissioners Public Hearing: December 18, 2023 (postponed Public Hearing approved at the BOC meeting November 20, 2023)
 1. Publication Dates: November 01, 2023, and November 05, 2023
 - v. Postponed per the applicant request on November 2, 2023

III. APPLICATION REVIEW:

When reviewing an application for rezoning, the Board of Commissioners shall consider and be guided by Article 3. Below is highlighted Section 100.24, Section 100.38-7, Section 100.38-8 and Section 100.38-10 as set forth in UDO below:

Sec. 100.24 Board of Commissioners

Without limiting any authority granted to the Board of Commissioners by General Statutes or by other Ordinances of the Town, the Board of Commissioners shall have the following powers and duties with respect to this Ordinance:

- 1. To adopt, amend or repeal this Ordinance;*
- 2. To adopt amendments to the Official Zoning Map;*
- 3. To adopt design guidelines for the Historic Preservation Overlay Districts;*
- 4. To approve or deny requests for approval of major preliminary and final subdivision plats, Special Use Permits, Conditional Zoning, Vested Rights, and major site plans;*
- 5. To perform the powers and duties of a Board of Adjustment; and,*
- 6. Such additional powers and duties as may be set forth in this Ordinance.*

Section 100.38-8 Public Hearing for a Special Use Permit Application:

A. Notice of hearings conducted pursuant to this section shall be mailed to the person or entity whose appeal, application, or request is the subject of the hearing; to the owner of the property that is the subject of the hearing if the owner did not initiate the hearing; to the owners of all parcels of land abutting the parcel of land that is the subject of the hearing; and to any other persons entitled to receive notice as provided by the zoning or unified development ordinance. In the absence of evidence to the contrary, the city may rely on the county tax listing to determine owners of property entitled to mailed notice. The notice must be deposited in the mail at least 10 days, but not more than 25 days, prior to the date of the hearing. Within that same time period, the city shall also prominently post a notice of the hearing on the site that is the subject of the hearing or on an adjacent street or highway right-of-way.

B. The Board of Commissioners, after a quasi-judicial hearing, may decide, in particular cases, and subject to appropriate conditions and safeguards, permits for conditional uses as authorized by the Table of Permitted and Conditional Uses. In granting a Special Use Permit, the Board shall make the following determinations.

- 1. The use requested is among those listed as an eligible Conditional Use in the Table of Permitted and Conditional Uses for the district in which the subject property is located;*
- 2. The application is complete.*
- 3. The conditional use meets all required conditions and specifications of this chapter; and that satisfactory provision and arrangement has been made for at least the following, where applicable:*
 - a. Satisfactory ingress and egress to property and proposed structures thereon, with particular reference to automotive and pedestrian safety and convenience, traffic flow and control.*
 - b. Provision of off street parking and loading areas where required, with particular attention to the items in (1) above, and the economic, noise, glare and odor effects of the conditional use on adjoining properties in the area*
 - c. Adequate and proper utilities, with reference to location, availability and compatibility.*
 - d. Buffering, with reference to type, location and dimensions.*
 - e. Signs, if any, and proposed exterior lighting, with reference to glare, traffic safety, economic effect and compatibility and harmony with properties in the district.*
 - f. Playgrounds, open spaces, yards, landscaping, access ways, pedestrian ways, with reference to location, size and suitability.*

- g. Buildings and structures, with reference to location, size and use.
- h. Hours of operation, with particular reference to protecting and maintaining the character of the neighborhood.
- i. Stormwater management

C. Even if the Town Board finds the application complies with all other provisions of this Ordinance, it may still deny the permit if it concludes, based upon the information submitted at the hearing, that if completed as proposed, the development, more probably than not:

- 1. Will materially endanger the public health or safety, or
- 2. Will substantially injure the value of adjoining or abutting property, or
- 3. Will not be in harmony with the area in which it is to be located, or
- 4. Will not be in general conformity with the Land Use Plan, Comprehensive Transportation Plan, Bicycle and Pedestrian Plan or other plans officially adopted by the Town Board of Commissioners.
- 5. Will not meet one of the conditions required by this Ordinance (see Section 100.37-8D)

D. In granting a Special Use Permit, the Board may impose such additional restrictions and requirements upon such Permit as it may deem necessary in order that the purpose and intent of this Ordinance are served, public welfare secured, and substantial justice done. Conditions shall not be put in place for which the local government does not have authority to enforce or for which the courts have held to be unenforceable. If all requirements and conditions are accepted by the applicant, the Board shall authorize the issuance of a Special Use Permit, otherwise the Permit shall be denied.

E. The conditions shall be accepted by the applicant/property owner in writing before the permit becomes effective.

F. Any Special Use Permit so authorized shall be perpetually binding upon the property included in such Permit unless subsequently changed or amended by the Board, as provided for in this Section. No proposal to amend or change any Special Use Permit shall be considered within six (6) months of the date of the original authorization of such Permit or within six (6) months of hearing of any previous proposal to amend or change any such Permit.

Sec. 100.38-10 Board of Commissioners Action on Special Use Permits

In considering whether to approve an application for a Special Use Permit, the Town Board shall proceed according to the following format:

(A) A simple majority vote of the Town Board is required to approve any motion related to the issuance of a Special Use Permit.

(B) The Town Board shall consider whether the application is complete. If the Town Board concludes that the application is incomplete and the applicant refuses to provide the necessary information, the application shall be denied. A motion to this effect shall specify either the particular type of information lacking or the particular requirement with respect to which the application is incomplete. If a motion to this effect is not approved, this shall be taken as an affirmative finding by the board that the application is complete.

(C) The Town Board shall consider whether the application complies with all of the applicable requirements of this chapter. If a motion to this effect passes, the Town Board need not make further findings concerning such requirements. If such a motion fails or is not made, then a motion shall be made that the application be found not in compliance with one or more of the requirements of this chapter. Such a motion shall specify the particular requirements the application fails to meet. Separate votes may be taken with respect to each requirement not met by the application. It shall be

conclusively presumed that the application complies with all requirements not found by the Town Board to be unsatisfied through this process.

(D) If the Town Board concludes that the application fails to comply with one or more requirements of this chapter, the application shall be denied. If the Town Board concludes that all such requirements are met, it shall issue the permit, unless it adopts a motion to deny the application for one or more of the reasons set forth in C above. Such a motion shall propose specific findings, based upon the evidence submitted, justifying such a conclusion.

(E) Subject to subsection (F), in granting a Special Use Permit, the permit-issuing board may, by a simple majority vote, attach to the permit such reasonable requirements in addition to those specified in this Chapter as will ensure that the development in its proposed location:

- (1) Will not endanger the public health or safety,*
- (2) Will not injure the value of adjoining or abutting property,*
- (3) Will be in harmony with the area in which it is located, and*
- (4) Will not be in general conformity with the Land Use Plan, Comprehensive Transportation Plan, Bicycle and Pedestrian Plan or other plans officially adopted by the Town Board of Commissioners.*
- (5) Meets the specific conditions applicable (See Section 100.37-8D).*

(F) The permit-issuing board may not attach additional conditions that modify or alter the specific requirements set forth in this chapter unless the development in question presents extraordinary circumstances that justify the variation from the specified requirements.

(G) Without limiting the foregoing, the Board of Commissioners may attach to a permit a condition limiting the permit to a specified duration.

(H) All additional conditions or requirements shall be entered on the permit.

(I) All additional conditions or requirements authorized by this section are enforceable in the same manner and to the same extent as any other applicable requirement of this chapter.

(J) A vote may be taken on application conditions or requirements before consideration of whether the permit should be denied for any reasons set forth above.

A. Staff Comments:

Jennifer Hunt, Town Planner, sent the applicant the list of requirements below and asked them to respond to how adding a crematorium to their existing building would impact the community.

- 1. Will materially endanger the public health or safety, or*
- 2. Will substantially injure the value of adjoining or abutting property, or*
- 3. Will not be in harmony with the area in which it is to be located, or*
- 4. Will not be in general conformity with the Land Use Plan, Comprehensive Transportation Plan, Bicycle and Pedestrian Plan or other plans officially adopted by the Town Board of Commissioners.*
- 5. Please describe how your project meets our current UDO standards.*

The applicant responded and said that funeral homes and creameries do not endanger public health, nor do they pose any safety hazard when operated. The applicant stated that there has never been one instance where a funeral home and/or crematory has any adverse effect on property values, that property values are not based upon what type of business or structure is attached to a piece of property. In addition, the applicant states that funeral homes and crematories are a valuable resource and are a necessary service for families in the community at the time of a

loved one passing. The funeral home and crematory will meet all Department of Environmental Quality conditions and local permitting conditions. The crematory will be contained inside our existing building and will not be visible to the public. Loading and unloading will be done inside the building when all the doors are closed. This process is already in place as all human remains are taken into their care through the existing building.

In addition, Jennifer Hunt asked how the applicant the following three additional questions below:

- 1. How will you deal with the smoke from the crematory? Where will the smoke go? How will the smell and noise impact the children and the school near your funeral home?*
- 2. How and where will the cars be parked when the crematory is in place, off street parking and loading areas? Will the bodies be visible from the street?*
- 3. Are there environmental regulations for putting a crematory at this site?*

The applicant states that the manufacturer assures us that when properly operated that there will be no visible smoke to the public eye. Any exhaust that comes out of the crematory will exit out the stack through the roof of the building. There is never an odor, and the noise is less than 40 decibels when running and should never be heard outside of the building. Two people can stand beside the machine and carry on a normal conversation.

Moreover, the applicant states there should not be any cars unless on the rare occasions someone wants to witness the cremation. In that case the cars would park on the street or beside the crematory building. 99% of cremations are done without any family present. The human remains will never be visible from the street. The vehicles transporting the human remains will drive into the building and the door will be closed before any human remains are unloaded. We take great pride in honoring the deceased in a caring and professional way.

Lastly, the applicant states for the third question that there are no environmental regulations for putting the crematory at the site, it will run off of propane and electricity.

The applicant is proposing to enclose the car parking area, adjacent to the funeral home, to be able to use for storage, or later convert it into chapel space. The applicant stated this verbally when he met with Jennifer Hunt onsite to discuss the Special Use Permit request.

Per UDO Section 100.38-14 (B) "Whenever a Special Use Permit is issued to authorize development, nothing authorized by the permit may be done until the record owner of the property signs a written acknowledgment that the permit has been issued and the permit is subsequently recorded in the Moore County Registry and indexed under the record owner's name as grantor." Therefore, if the Special Use Permit is approved by the Board, the applicant will need to follow the directions above and provide a copy to the Town, before developing the crematorium in the existing building.

IV. PLANNING BOARD RECOMMENDATIONS:

1. Will present verbally at the meeting due to the rescheduling of the Planning Board meeting.

V. ATTACHMENTS PROVIDED BY THE APPLICANT:

1. Proposed Sketch

VI. BOARD OF COMMISSIONERS ACTION:

In considering whether to approve an application for a Special Use Permit, the Town Board shall proceed according to the following format:

- (A) A simple majority vote of the Town Board is required to approve any motion related to the issuance of a Special Use Permit.

(B) The Town Board shall consider whether the application is complete. If the Town Board concludes that the application is incomplete and the applicant refuses to provide the necessary information, the application shall be denied. A motion to this effect shall specify either the particular type of information lacking or the particular requirement with respect to which the application is incomplete. If a motion to this effect is not approved, this shall be taken as an affirmative finding by the board that the application is complete.

(C) The Town Board shall consider whether the application complies with all of the applicable requirements of this chapter. If a motion to this effect passes, the Town Board need not make further findings concerning such requirements. If such a motion fails or is not made, then a motion shall be made that the application be found not in compliance with one or more of the requirements of this chapter. Such a motion shall specify the particular requirements the application fails to meet. Separate votes may be taken with respect to each requirement not met by the application. It shall be conclusively presumed that the application complies with all requirements not found by the Town Board to be unsatisfied through this process.

(D) If the Town Board concludes that the application fails to comply with one or more requirements of this chapter, the application shall be denied. If the Town Board concludes that all such requirements are met, it shall issue the permit, unless it adopts a motion to deny the application for one or more of the reasons set forth in C above. Such a motion shall propose specific findings, based upon the evidence submitted, justifying such a conclusion.

(E) Subject to subsection (F), in granting a Special Use Permit, the permit-issuing board may, by a simple majority vote, attach to the permit such reasonable requirements in addition to those specified in this Chapter as will ensure that the development in its proposed location:

- (1) Will not endanger the public health or safety,
- (2) Will not injure the value of adjoining or abutting property,
- (3) Will be in harmony with the area in which it is located, and
- (4) Will not be in general conformity with the Land Use Plan, Comprehensive Transportation Plan, Bicycle and Pedestrian Plan or other plans officially adopted by the Town Board of Commissioners.
- (5) Meets the specific conditions applicable (See Section 100.37-8D).

(F) The permit-issuing board may not attach additional conditions that modify or alter the specific requirements set forth in this chapter unless the development in question presents extraordinary circumstances that justify the variation from the specified requirements.

(G) Without limiting the foregoing, the Board of Commissioners may attach to a permit a condition limiting the permit to a specified duration.

(H) All additional conditions or requirements shall be entered on the permit.

(I) All additional conditions or requirements authorized by this section are enforceable in the same manner and to the same extent as any other applicable requirement of this chapter.

(J) A vote may be taken on application conditions or requirements before consideration of whether the permit should be denied for any reasons set forth above. The Planning Board shall evaluate all proposals for consistency with any adopted long-range plans and adopt a statement of consistency with said plans before voting to recommend approval or denial of the request. All proposed Development Ordinance amendments must be given review by the Planning Board for a recommendation to the Board of Commissioners. They are not required to conduct a public hearing, but they are encouraged to accept public input, per UDO Section 100.42 and 100.44.

PETITION MOTION

And, therefore, I move to:

OPTION 1

Approve SUP-01-23 as written and presented.

or

OPTION 2

Approve SUP-01-23 with the following conditions.....

OPTION 3

Deny SUP-01-23 for the following reasons.....

Robert Nunnaley, Director

Fry & Prickett Funeral Home
Kennedy Funeral Home
Powell Funeral Home & Crematory
Pinelawn Memorial Park
910.947.2224

RE: Public Hearing.

Robert,

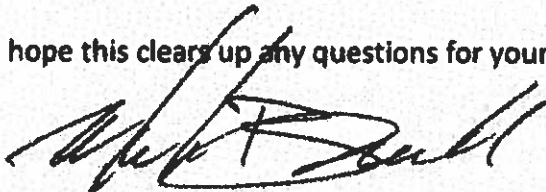
This letter is to address the questions posed for your public hearing for your American Crematory Equipment Model A-300- Instant Access.

The A-300 is a state-of-the-art cremator and operates on PLC controls and is designed to operate efficiently and effectively. The A-300 source test data shows that our cremators combust the products of cremation more efficiently than other competitor equipment. We consider our equipment the cleanest burning cremator on the market. The cremator is designed to operate without producing upset conditions of smoke or odor, which is always the primary concern of municipality and DEQ/AQMD. We have developed an operator-friendly system that prevents mistakes from being made when operating the cremator and automatically corrects if an upset condition occurs.

American Crematory will provide onsite training for you and your staff on the operation of the A-300 and certify all staff members as factory trained in the operation of the A-300 cremator.

The decibel level from the combustion air blower is one of the quietest in the industry. Our blower operates at 70-71 decibels. There is virtually no noise emitted to the outside of the building where the unit is placed. In most cases the public does not know a cremator is being operated at the facility until they need the funeral homes services.

I hope this clears up any questions for your public hearing.

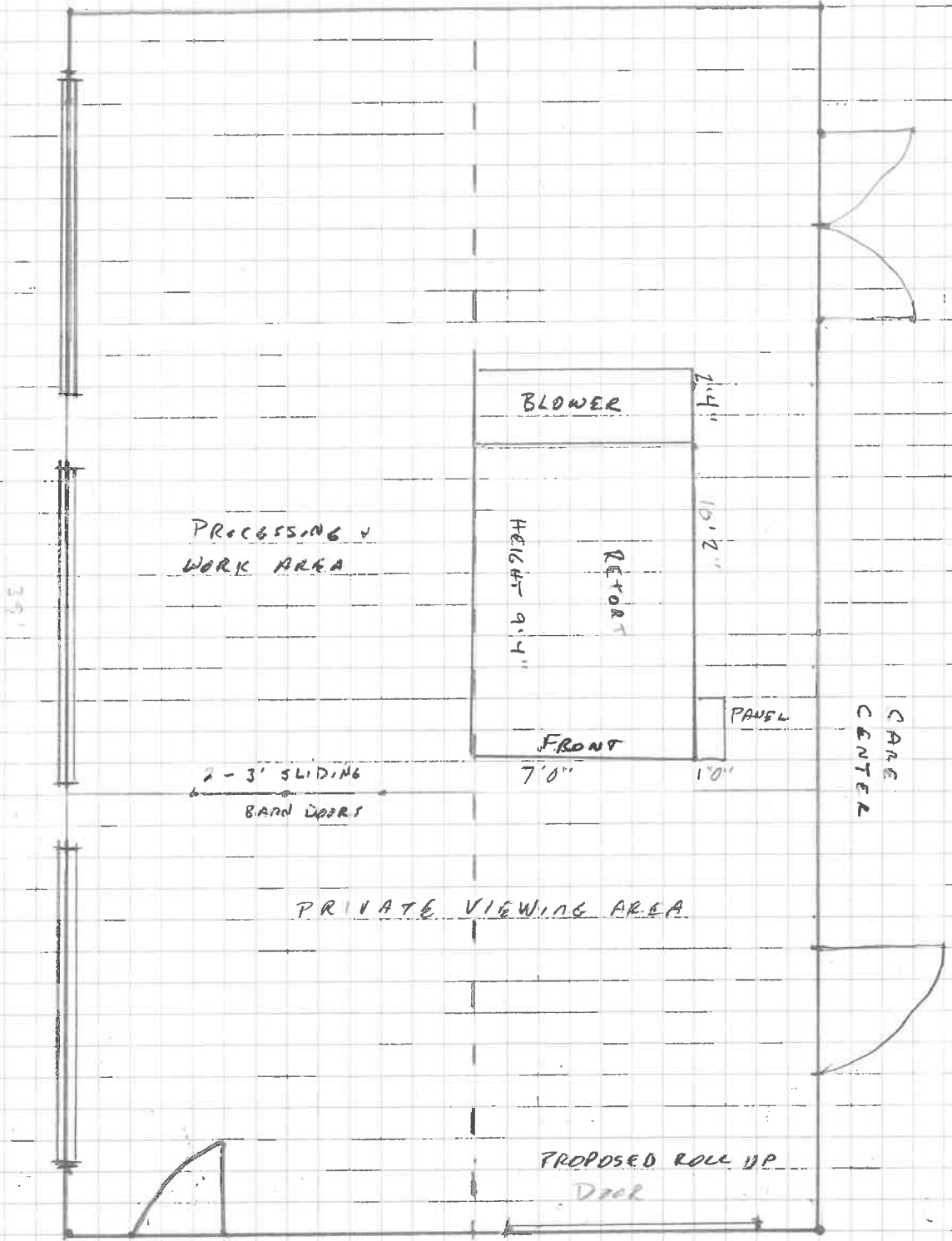


Mike Burwell

CEO

American Crematory Equipment Co.

STEEL BEAM
3 1/2" FROM
FLOOR TO CEILING



CREMATORIA AND AIR QUALITY FACT SHEET



In Canada, preference for cremation is increasing. The Cremation Association of North America (CANA) estimates that about 80% of human remains in Canada will be cremated by 2020. The increased demand for cremation services may result in construction of new crematoria or expansion of existing facilities. This could lead to a rise in inquiries about potential health risks to nearby communities. This fact sheet outlines the key facts about potential exposure to emissions from crematoria, and controls for reducing risks. Communication with the public about potential impacts and risk reduction strategies early in the development process can help to address concerns, and inform appropriate siting, operational controls and monitoring.

Types of emissions

- **Combustion gases:** carbon monoxide (CO), nitrogen oxides (NO_x), sulphur dioxide (SO₂) and volatile organic compounds (VOC)
- **Particulate matter and fine dust:** PM₁₀ and PM_{2.5}
- **Organic pollutants:** polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) and polycyclic aromatic hydrocarbons (PAH) and others resulting from incomplete combustion or formed when organic compounds react with chlorine in materials such as plastics
- **Heavy metals:** Mercury (Hg) arising from volatilization of Hg in dental amalgam in fillings and trace amounts of metals in tissues of the individual, or items in the casket
- **Radioactive substances:** arising from cremation of deceased patients treated with radioactive substances (e.g., cancer treatments)

Levels of emissions

- Crematoria are usually considered small-scale installations with relatively low total emissions compared to other types of incineration facilities such as municipal waste incinerators or industrial processes.
- Crematoria contribute approximately 5% of total PCDD/Fs, 6% of total Hg emissions and 0.25% of PM_{2.5} emissions in Canada.

The pollutants of most concern are PCDD/Fs, Hg and fine particulate matter (PM_{2.5}). PCDD/Fs and Hg are known to be toxic to humans and can bioaccumulate in tissues. PCDD/Fs are classified as possible human carcinogens and Hg is a neurotoxin. Exposure to PM_{2.5}, which can reach deep into the lungs, can increase the risks of heart disease, lung cancer, asthma and adverse birth outcomes, and exacerbate other conditions such as diabetes. Care should be taken to limit exposure, particularly for vulnerable populations such as babies, children, pregnant women, and the elderly.

While these substances have been associated with a range of adverse health effects, no studies have been found that show causal links between crematoria emissions and adverse health effects. The absence of emissions data for crematoria and ambient air quality monitoring in the vicinity of installations limits the ability to fully assess exposures and health impacts. A precautionary approach could be adopted that includes following best practice recommendations for siting, design, operation, monitoring and maintenance of crematoria.

Table 1: Factors affecting the type and level of emissions from crematoria

The composition of the casket and remains	<ul style="list-style-type: none"> • The size of the corpse and number of cremations • The presence of dental amalgam fillings containing Hg • Plastics or polystyrene parts in the funeral casket or personal/memorial items (forming organic pollutants) • Burial caskets coated in insecticides or preservatives • The presence of radioactive substances within the remains
The design of the system	<ul style="list-style-type: none"> • The presence of two combustion chambers allowing for high temperature treatment of gases and particulate • Chimney height affects the distribution and dilution of emissions into the atmosphere and dispersion at ground level • Age of equipment; older equipment is less likely to have modern process controls and monitors, and is also more prone to failure
Operational parameters of the cremator	<ul style="list-style-type: none"> • Temperature at start-up and in the second chamber • Residence time for gases in the second chamber • O₂ available for combustion • Good operation and maintenance practices • Use of process controls and continuous monitoring
Emissions control measures	<ul style="list-style-type: none"> • Source control (restrictions on what is incinerated) • Presence of flue gas treatment, acid neutralization, activated carbon adsorption, dust collection or specific emissions control measures such as Hg-abatement equipment, scrubbers and technologies that bind or precipitate Hg

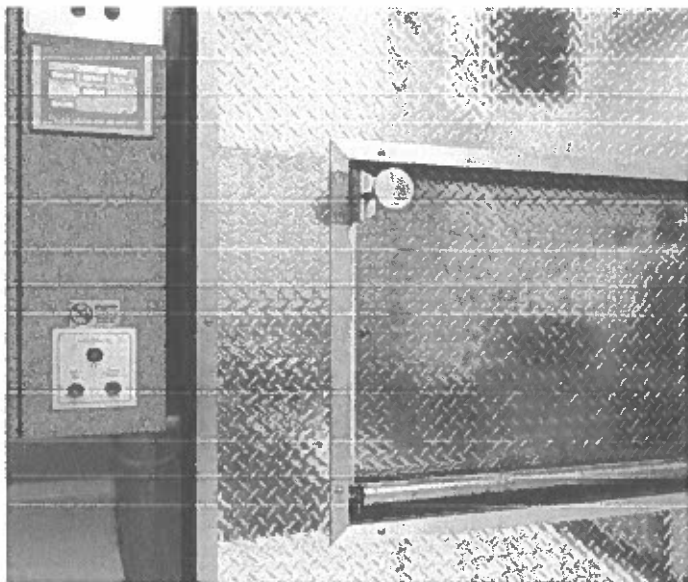
Standard practice for siting of crematorium in proximity to residential areas

Every site is unique with the type and levels of emissions affected by factors listed in Table 1 and local dispersion of air pollutants affected by prevailing wind direction and topography. There is no standard practice for setback distances between crematoria and residential areas in Canada but many regional and local permitting and zoning practices set out where crematoria are permitted or prohibited along with other specifications. For example, crematoria may be permitted in conjunction with a cemetery or in specified zones (Industrial) with minimum separation distances required between crematoria and sensitive receptors such as schools, daycares, libraries, or care facilities (e.g., 20-70m). Appropriate setback requirements may also take into account air dispersion modelling on a case-by-case basis.

Prepared by:
Juliette O'Keefe
National Collaborating Centre for Environmental Health



National Collaborating Centre
for Environmental Health
Centre de collaboration nationale
en santé environnementale



Key Recommendations

The Secretariat of the Stockholm Convention on Persistent Organic Pollutants has published best practice guidelines for crematoria, which align with recommendations cited throughout the literature. Table 2 lists the effectiveness of various control measures. The key recommendations include:

- Minimum furnace temperature (850 °C), residence time in the second chamber (2 s) and enough air (e.g., 6% O₂ by volume) to ensure efficient combustion;
- Suitable air pollution control equipment (e.g., temperature controls, dust control, carbon injection, fabric filtration, air tightness of crematoria);
- Monitoring of gas temperature and flue gas O₂ and CO concentrations; use of relevant emission limit values and additional monitoring including ambient monitoring of soil and air in the proximity of crematoria;
- Avoidance of use of PVC, metals and chlorinated compounds in coffins and fittings;
- Operational controls, inspection and preventive maintenance.

Table 2. Effectiveness of various control measures on reducing pollutant release from crematoria*

	PCDD/ Fs	Hg	PM _{2.5}	Radio- activity
Source control				
Removal of plastics, etc.	✓		✓	
Non-toxic and eco-friendly coatings or materials in caskets	✓			
Removal of Hg fillings		✓		
Removal of medical devices containing radioactive substances				✓
Operational controls				
Minimum 850°C (2 nd chamber)	✓		✓	
Minimum residence time of 2 s (2 nd chamber)	✓		✓	
Adequate O ₂ in combustion chamber	✓		✓	
Monitoring CO releases	✓		✓	
Air tightness of combustion chambers and casings	✓	✓	✓	✓
Maintenance and inspection	✓	✓	✓	✓
Operator training	✓	✓	✓	✓
Emissions controls				
Dust control (filters and scrubbers)	✓		✓	
Activated carbon treatment	✓	✓		
Hg removal technology (binding, precipitation etc.)		✓		
Adequate chimney height	General dispersion and dilution of pollutants higher into atmosphere			

✓ indicates the measure can help reduce emissions
*See page 1 for description of pollutants

This fact sheet presents the key messages from a field inquiry titled "Crematoria emissions and air quality impacts".

The full document and references can be found at: <http://www.ncceh.ca/documents/field-inquiry/crematoria-emissions-and-air-quality-impacts>

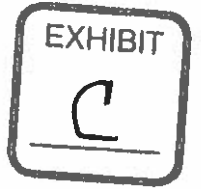
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2020 National Emissions Inventory Technical Support Document: Miscellaneous Non- Industrial NEC: Cremation – Human and Animal

2020 National Emissions Inventory Technical Support Document: Miscellaneous Non-Industrial
NEC: Cremation – Human and Animal

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Assessment Division
Research Triangle Park, NC

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29 Miscellaneous Non-Industrial NEC: Cremation – Human and Animal

29.1 Sector Descriptions and Overview

The cremation of human remains results in emissions of particulate matter, SO₂, NO_x, VOC, CO, and HAPs. It is a significant source of mercury emissions, due to mercury in dental fillings, as well as mercury in blood and tissues.

The cremation of animals also results in emissions of CAPs and HAPs, though it emits less mercury than human cremation.

SCCs for human and animal cremation are provided in Table 29-1.

Table 29-1: Human and animal cremation SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2810060100	Miscellaneous Area Sources	Other Combustion	Cremation	Humans
2810060200	Miscellaneous Area Sources	Other Combustion	Cremation	Animals

A list of agencies that submitted human and/or animal cremation emissions is provided in Section 6.2.3.

29.2 EPA-developed estimates

The calculations for estimating emissions from human cremation involve estimating the number of deaths in each age group in each county, using data from the Centers for Disease Control and Prevention. The number of deaths is multiplied by the average weight by age group and the state-level cremation rate from the National Funeral Directors Association to estimate the total amount of cremations in each county in terms of mass. This number is multiplied by an emissions factor to estimate the emissions of CAPs and HAPs. Emissions of mercury include emissions from mercury in fillings in teeth and in blood and tissues. The emissions from mercury in fillings are estimated based on data on the number of filled teeth per person in each age group and assumptions about the proportion of fillings that contain mercury and the amount of mercury in each filling.

The calculations for estimating emissions from animal cremation involve determining the number of cremated animals nationally and distributing this number to each county based on population. The number of cremated animals is multiplied by average weights for cats and dogs to determine the amount of cremations in each county in terms of mass. This number is multiplied by an emissions factor to estimate the emissions of CAPs and HAPs.

29.2.1 Activity data

Human Cremation

The activity data for human cremation is based on the number of deaths in each county in 13 age groups, from the Centers for Disease Control and Prevention WONDER database [ref 1]. Data for some counties are withheld in the WONDER database. These gaps are filled using the data on the total number of deaths by age group in each state (which includes the number of deaths that are withheld at the county level). First, the sum of the reported county-level number of deaths in each age group and state is subtracted from the reported state-level

number of deaths in each age group to determine the total number of deaths withheld at the county level in each state and age group.

$$Deaths_withheld_{s,a} = Deaths_state_{s,a} - \sum Deaths_county_{s,a} \quad (H1)$$

Where:

- $Deaths_withheld_{s,a}$ = Total number of withheld deaths in state s in age group a
- $Deaths_state_{s,a}$ = Total number of deaths reported at the state level in state s in age group a
- $Deaths_county_{s,a}$ = Total number of deaths reported at the county level in state s in age group a

The total number of withheld deaths are distributed to the counties based on the proportion of population in those counties to the total state population.

$$Pop_ratio_c = \frac{Pop_c}{Pop_s} \quad (H2)$$

Where:

- Pop_ratio_c = The population ratio used to distribute withheld deaths in state s to county c
- Pop_c = The total population of county c
- Pop_s = The total population of state s

The number of withheld deaths in each state is multiplied by the county population ratio to distribute the withheld deaths to the counties. Note that this step is only performed for counties where county-level data on number of deaths is withheld; this step is not performed where county-level data on deaths is reported.

$$Deaths_{c,a} = Deaths_withheld_{s,a} \times Pop_ratio_c \quad (H3)$$

Where:

- $Deaths_{c,a}$ = The number of deaths in county c in age group a
- $Deaths_withheld_{s,a}$ = Total number of withheld deaths in state s in age group a , from equation H1
- Pop_ratio_c = The population ratio used to distribute withheld deaths in state s to county c , from equation H2

The total number of deaths in each county (either reported directly in the CDC WONDER database or estimated using equation H3) is multiplied by a state-level cremation rate, reported by the National Funeral Directors Association (NFDA) [ref 2], shown in Table 29-2. It is assumed that the state-level cremation rate applies to all counties within the state.

$$Cremations_{c,a} = Deaths_{c,a} \times Cremation_rate_s \quad (H4)$$

Where:

- $Cremations_{c,a}$ = The number of human cremations in county c in age group a
- $Deaths_{c,a}$ = The number of deaths in county c in age group a
- $Cremation_rate_s$ = The rate of human cremations in state s , from Table 29-2 [ref 2]

Table 29-2: Human cremation rate by state

State	Cremation Rate
Alabama	23.1%
Alaska	66.3%
Arizona	66.1%
Arkansas	32.7%
California	63.4%
Colorado	68.6%
Connecticut	50.3%
Delaware	46.2%
District of Columbia	40.0%
Florida	62.4%
Georgia	37.1%
Hawaii	72.7%
Idaho	56.8%
Illinois	42.8%
Indiana	36.6%
Iowa	42.2%
Kansas	44.6%
Kentucky	24.5%
Louisiana	26.3%
Maine	70.0%
Maryland	40.6%
Massachusetts	43.4%
Michigan	54.9%
Minnesota	57.2%
Mississippi	18.2%
Missouri	39.7%

Montana	72.8%
Nebraska	43.8%
Nevada	76.9%
New Hampshire	70.3%
New Jersey	40.6%
New Mexico	58.9%
New York	39.6%
North Carolina	39.8%
North Dakota	35.3%
Ohio	42.3%
Oklahoma	39.0%
Oregon	74.1%
Pennsylvania	43.1%
Rhode Island	46.6%
South Carolina	37.4%
South Dakota	35.4%
Tennessee	28.1%
Texas	39.3%
Utah	31.2%
Vermont	67.3%
Virginia	36.1%
Washington	75.5%
West Virginia	27.3%
Wisconsin	52.5%
Wyoming	66.7%

The CDC provides estimates of the average weight of individuals in each age group [ref 3]. This number is multiplied by the number of cremations in each county in each age group and then summed across all age groups to estimate the total amount of cremations in tons in each county.

$$Cremations_tons_c = \sum_{a=1}^A Cremations_{c,a} \times W_a \times \frac{1 \text{ ton}}{2,000 \text{ lbs}} \quad (H5)$$

Where:

- $Cremations_tons_c$ = The weight of humans cremated in county c , in tons
- $Cremations_c$ = The number of human cremations in county c , from equation H4
- W_a = The average weight of individuals from age group a

Animal Cremation

The Pet Loss Professionals Alliance (PLPA) conducted a survey that estimated that there were 1,840,965 pet cremations in 2012, and that 99 percent of deceased pets are cremated [ref 4]. In addition, the Humane Society of the United States estimates that there are 2,700,000 adoptable dogs and cats euthanized in animal shelters each year [ref 5]. It is assumed that all of these shelter animals are cremated. Therefore, there are a total of approximately 4,540,965 animal creations each year. Note that this estimate does not double count the number of animal cremations, because the PLPA study counts the number of cremations of pets—i.e. animals that are owned by people—whereas the Humane Society estimates are for animals in shelters that were not adopted.

The population of cats and dogs is approximately 52.5 percent cats and 48.5 percent dogs [ref 5]. Using this percentage and the total number of pets and shelter animals cremated annually, a total number of cats and a total number of dogs cremated annually can be calculated.

$$Cremations_{c/d,US} = Ratio_{c/d} \times (Cremations_{pets,US} + Cremations_{shelter,US}) \quad (A1)$$

Where:

- $Cremations_{c/d}$ = Total cats, c , or dogs, d , cremated annually in the United States
- $Ratio_{c/d}$ = Ratio of cats, c , or dogs, d , in the pet population
- $Cremations_{pets,US}$ = Total number of pets cremated annually in the United States
- $Cremations_{shelter,US}$ = Total number of shelter animals cremated annually in the United States

The average weight of a domestic cat is approximately 4.5 kg (9.9 pounds) [ref 6]. The average weight of a dog is difficult to determine due to large differences in breeds, but an average across breeds is 48.5 pounds [ref 7]. Note that this is a straight average of the average adult weight for male and female dogs across breeds. It is not a weighted average that takes into account the popularity of different breeds in the United States. To calculate the weight, in tons, of both cats and dogs cremated annually, the average weight values are multiplied by the total number of cats and total number of dogs cremated annually.

$$Cremations_tons_{c/d} = Cremations_{c/d} \times Weight_{c/d} \times \frac{1 \text{ ton}}{2,000 \text{ pounds}} \quad (A2)$$

Where:

$Cremations_tons_{c/d,US}$ = Total weight, in tons, of cats, c , or dogs, d , cremated annually in the United States
 $Cremations_{c/d,US}$ = Total cats, c , or dogs, d , cremated annually in the United States
 $Weight_{c/d}$ = Average weight per animal, in pounds, of cats, c , or dogs, d

Once the weight of cats and weight of dogs cremated annually has been calculated, these values can be summed to derive a total weight of animals cremated annually.

$$Cremations_tons_{animal} = Cremations_tons_c + Cremations_tons_d \quad (A3)$$

Where:

$Cremations_tons_{animal,US}$ = Total weight of animals cremated annually in the United States, in tons
 $Cremations_tons_c,US$ = Total weight of cats, c , cremated annually in the United States, in tons
 $Cremations_tons_d,US$ = Total weight of dogs, d , cremated annually in the United States, in tons

29.2.2 Allocation procedure

Human Cremation

The number of deaths is reported by the CDC at the county level. Therefore, these data do not need to be allocated. For counties with withheld data on the number of deaths, the total number of withheld deaths is distributed to counties based on the proportion of population in those counties, as described in equations H1-H3.

Animal Cremation

The estimated national-level total weight of animals cremated are allocated to the county level based on the ratio of population in each county to the total national population.

$$Cremations_tons_{animal,c} = Cremations_tons_{animal,US} \times \frac{Pop_c}{Pop_{US}} \quad (A1)$$

Where:

$Cremations_tons_{animal,c}$ = Total weight of animals cremated in county c , in tons
 $Cremations_tons_{animal,US}$ = Total weight of animals cremated annually in the United States, in tons, from equation A3
 Pop_c = The total population of county c
 Pop_{US} = The total population of the United States

29.2.3 Emission factors

Human and Animal Cremation – Blood and Tissues

The emissions factors for human and animal cremation for CAPs are from AP-42 [ref 8], and a report by EPA on emissions tests of a crematory [ref 9] and are in units of pounds of emissions per ton cremated. The emission factors for CAPs are also provided in the “Wagon Wheel Emission Factor Compendium” on the [2020 NEI Supporting Data and Summaries site](#). The emissions factors for most HAPs are a report

from the California Air Resources Board [ref 10], as well as from the EPA emissions test of a crematory. The VOC HAPs are computed in EIS using HAP Augmentation factors available in the zip file "HAPAugmentation_Nonpoint_28jan2023", on the [2020 NEI Supplemental data FTP site](#). The mercury emissions factor is from a review of multiple studies [ref 11]. These emission factors do not include emissions from dental fillings. As shown in Table 29-3, EPA uses the same emissions factors for emissions from cremation of blood and tissues for both humans and animals.

Table 29-3: Emissions factors for the cremation of human and animal blood and tissues

Pollutant	Pollutant Code	Emission Factor (lbs/ton)	Source
Carbon Monoxide	CO	2.947	8
Lead	7439921	0.009	9
Nitrogen Oxides	NOX	3.560	8
PM10 Primary	PM10-PRI	3.036	8 (65% of total PM)
PM2.5 Primary	PM25-PRI	2.022	8 (43.3% of total PM)
Sulfur Dioxide	SO2	2.173	8
Volatile Organic Compounds	VOC	0.299	8
Acenaphthene	83329	1.303E-06	10
Acenaphthylene	208968	8.971E-07	10
Acetaldehyde	75070	9.269E-04	10
Anthracene	120127	2.389E-06	10
Arsenic	7440382	5.097E-04	10
Benzo(a)anthracene	56553	1.166E-07	10
Benzo(a)pyrene	192972	4.720E-07	10
Benzo(b)fluoranthene	205992	1.737E-07	10
Benzo(g,h,i)perylene	191242	5.874E-07	10
Benzo(k)fluoranthene	207089	1.486E-07	10
Beryllium	7440417	1.760E-05	10
Cadmium	7440439	2.940E-03	9
Chromium (VI)	18540299	1.829E-04	10
Chrysene	218019	2.880E-07	10
Cobalt	7440484	8.869E-05	10
Dibenz(a,h)anthracene	53703	1.349E-07	10
Fluoranthene	206440	1.337E-06	10
Fluorene	86737	3.760E-06	10
Formaldehyde	50000	2.469E-04	10
Hydrogen Chloride	7647010	3.595E+00	9
Hydrogen Fluoride	7664393	8.651E-03	10
Indeno(1,2,3-cd)pyrene	193395	1.440E-07	10
Mercury	7439976	1.324E-04	10

Pollutant	Pollutant Code	Emission Factor (lbs/ton)	Source
Naphthalene	91203	7.520E-04	10
Nickel	7440020	4.149E-04	10
Phenanthrene	85018	1.531E-05	10
Pyrene	129000	1.474E-06	10
Selenium	7782492	4.971E-04	10

Human Cremation – Dental Mercury

In addition to mercury emitted from the cremation of blood and tissues, mercury is also emitted due to the cremation of dental fillings. The Bay Area Air Quality Management District (BAAQMD) issued a report in 2012 estimating the average amount of mercury in teeth per person for ten age groups, based on data from CDC's National Health and Nutrition Examination Survey [ref 12]. Table 29-4 shows the estimated amount of material in restored teeth by age group from the BAAQMD study [ref 12], which is matched to the age groups used by the CDC Wonder database, which is the source of data on deaths by age group.

The BAAQMD memorandum is used to estimate that 31.6 percent of filled teeth in the 5-24 age groups contain amalgam. According to the American Dental Association (ADA 1998) more than 75 percent of restorations before the 1970s used dental amalgam, which declined to 50 percent by 1991. Using these numbers, it is assumed that 50 percent of the filled teeth for 25-44 age groups contain amalgam, 62.5 percent of filled teeth in the 45-64 age group, and 75 percent of filled teeth for people over 65. The Food and Drug Administration has discouraged the use of dental amalgam in children under 6 [ref 13]. While EPA does not have data on the percent of fillings containing dental amalgam for the 1-4 age group, it is assumed that this age group has approximately half the dental amalgam of the other age groups under 20 years old. It is also assumed that children under the age of 1 have no dental mercury. The analysis also assumes that 45 percent of all amalgam-containing fillings are mercury, based on information from the Food and Drug Administration [ref 13].

Table 29-4: Estimated amount of material in restored teeth

Age Groups in CDC WONDER Database	Age Groups in BAAQMD Memorandum	Avg. Material in Restored Teeth (g)	% of Fillings Containing Mercury
< 1 year	0-4 years [†]	0.000	0.0%
1-4 years		0.160	15.8%
5-9 years	5-14 years	0.720	31.6%
10-14 years			
15-19 years	15-24 years	1.070	31.6%
20-24 years			
25-34 years	25-34 years	2.230	50.0%
35-44 years	35-44 years	3.290	50.0%
45-54 years	45-54 years	4.310	62.5%
55-64 years	55-64 years	4.320	62.5%
65-74 years	65-74 years	3.780	75.0%

Age Groups in CDC WONDER Database	Age Groups in BAAQMD Memorandum	Avg. Material in Restored Teeth (g)	% of Fillings Containing Mercury
75-84 years	75-84 years	3.650	75.0%
85+ years	85+ years	2.960	75.0%

The emissions factor for mercury in teeth is calculated by multiplying the average amount of material in restored teeth per person by the percentage of fillings containing mercury in each age group and the proportion of mercury in dental amalgam (approximately 45 percent).

$$EF_{teeth_{Hg,a}} = Material_a \times ContainHg_a \times HgProportion \times 0.0022 \frac{lb}{g} \quad (H6)$$

Where:

- $EF_{teeth_{Hg,a}}$ = Emission factor for mercury emissions from teeth due to cremation for age group a , in lbs. per cremation
- $Material_a$ = The average amount of material in restored teeth for age group a , in grams, from Table 29-4
- $ContainHg_a$ = The proportion of people in age group a with fillings that contain mercury, from Table 29-4
- $HgProportion$ = The proportion of dental amalgam that is mercury (approximately 45 percent)

29.2.4 Controls

There are no controls assumed for this source category.

29.2.5 Emissions

Human Cremation

To estimate the emissions of CAPs from human cremation, the total number of human cremations in each county, in tons, is multiplied by the emissions factor for each pollutant, from Table 29-3.

$$Emissions_{p,c} = Cremation_tons_c \times EF_p \quad (H7)$$

Where:

- $Emissions_{p,c}$ = Emissions of pollutant p from human cremation in county c , in pounds
- $Cremations_tons_c$ = The number of human cremations in county c , in tons
- EF_p = Emissions factor for pollutant p from human cremation, in lbs. per ton

The emissions from mercury in teeth are estimated based on the number of cremations rather than the weight. To estimate the emissions of mercury from teeth during human cremation, the number of cremations in each age group is multiplied by the emissions factor for each age group and then summed across age groups.

$$Emissions_{teeth_{Hg,c}} = \sum_{a=1}^A Cremations_{c,a} \times EF_{teeth_{Hg,a}} \quad (H8)$$

Where:

$Emissions_teeth_{Hg,c}$ = Emissions of mercury in teeth from human cremation in county c , in pounds
 $Cremations_{c,a}$ = The number of human cremations in county c in age group a
 $EF_teeth_{Hg,a}$ = Emissions factor for mercury emissions from teeth due to cremation for age group a , in lbs. per cremation

The emissions from mercury from blood and tissues are estimated by multiplying the total number of cremations in each county, in tons, by the emissions factor for mercury from blood and tissues.

$$Emissions_tissue_{Hg,c} = Cremations_tons_c \times EF_tissue_{Hg} \quad (H9)$$

Where:

$Emissions_tissue_{Hg,c}$ = Emissions of mercury in tissues from human cremation in county c , in pounds
 $Cremations_tons_c$ = The number of human cremations in county c , in tons
 $EF_tissue_{Hg,a}$ = Emissions factor for mercury emissions from blood and tissues due to cremation for in lbs. per ton

The total emissions of mercury from cremation in each county is calculated by adding the emissions of mercury from teeth and the emissions of mercury from tissues.

$$Emissions_{Hg,c} = Emissions_teeth_{Hg,c} + Emissions_tissue_{Hg,c} \quad (H10)$$

Where:

$Emissions_{Hg,c}$ = Emissions of mercury from human cremation in county c , in pounds
 $Emissions_teeth_{Hg,c}$ = Emissions of mercury in teeth from human cremation in county c , in pounds
 $Emissions_tissue_{Hg,c}$ = Emissions of mercury in tissues from human cremation in county c , in pounds

Animal Cremation

$$Emissions_{p,c} = Cremation_tons_c \times EF_p \quad (A5)$$

Where:

$Emissions_{p,c}$ = Emissions of pollutant p from animal cremation in county c , in pounds
 $Cremations_tons_c$ = The number of animal cremations in county c , in tons
 EF_p = Emissions factor for pollutant p from animal cremation, in lbs. per ton

29.2.6 Sample calculations

Table 29-5 lists the sample calculations for estimating mercury emissions from human cremation in the 85+ age group and animal cremation of cats in Clark County, ID. To estimate the total emissions in Clark County, these steps would be repeated to estimate emissions from all age groups and from cremation of dogs.

Table 29-5: Sample calculations for mercury emissions from human cremation for the 85+ age group and cremation of cats in Clark County, ID

Eq. #	Equation	Values for Clark County, ID	Result
H1	$\begin{aligned} &Deaths_{withheld_{s,a}} \\ &= Deaths_{state_{s,a}} \\ &- \sum Deaths_{county_{s,a}} \end{aligned}$	<p>4,013 state level deaths - 3,997 total county level deaths</p>	16 withheld deaths in Idaho
H2	$Pop_{ratio_c} = \frac{Pop_c}{Pop_s}$	$\frac{873 \text{ people in Clark County}}{1,975 \text{ total population of counties with withheld deaths}}$	0.442 population ratio
H3	$\begin{aligned} &Deaths_{c,a} \\ &= Deaths_{withheld_{s,a}} \\ &\times Pop_{ratio_c} \end{aligned}$	16 withheld deaths \times 0.442 population ratio	7 deaths in Clark County, ID
H4	$\begin{aligned} &Cremations_{c,a} \\ &= Deaths_{c,a} \\ &\times Cremation_{rate_s} \end{aligned}$	7 deaths \times 56.8% cremation rate	4 cremations in Clark County, ID
H5	$\begin{aligned} &Cremations_{tons_c} \\ &= \sum_{a=1}^A Cremations_{c,a} \times W_a \\ &\times \frac{1 \text{ ton}}{2,000 \text{ lbs}} \end{aligned}$	4 cremations \times 158.25 lbs per person in 85+ age group \div 2000 lbs per ton	0.3165 tons cremation in Clark County, ID
H6	$\begin{aligned} &EF_{teeth_{Hg,a}} \\ &= Material_a \times ContainHg_a \\ &\times HgProportion \\ &\times 0.0022 \frac{lb}{g} \end{aligned}$	2.96 g mercury \times 75% with mercury \times 45% of fillings are mercury \times 0.0022	0.0022 lbs mercury per cremation
H7	$\begin{aligned} &Emissions_{p,c} \\ &= Cremation_{tons_c} \times EF_p \end{aligned}$	N/A	Complete in equation H9 for mercury
H8	$\begin{aligned} &Emissions_{teeth_{Hg,c}} \\ &= \sum_{a=1}^A Cremations_{c,a} \\ &\times EF_{teeth_{Hg,a}} \end{aligned}$	4 cremations \times 0.0022 lbs per cremation	0.0088 lbs mercury from teeth in 85+ age group in Clark County, ID

Eq. #	Equation	Values for Clark County, ID	Result
H9	$Emissions_{tissue\ Hg,c}$ $= Cremations_{tons\ c}$ $\times EF_{tissue\ Hg}$	0.3165 tons cremations × 0.0015 lbs per ton	0.00047 lbs. mercury from tissues in 85+ age group in Clark County, ID
H10	$Emissions_{Hg,c}$ $= Emissions_{teeth\ Hg,c}$ $+ Emissions_{tissue\ Hg,c}$	0.0088 lbs from teeth + 0.00047 lbs. from tissues	0.0093 lbs mercury from cremation of 85+ age group in Clark County ID
A1	$Cremations_{c/d,US}$ $= Ratio_{c/d}$ $\times (Cremations_{pets_{US}}$ $+ Cremations_{shelter_{US}})$	52.5% of cats in pet population × (1,840,965 pet cremations + 2,700,000 shelter animal cremations)	2,384,006 cremated cats in the U.S.
A2	$Cremations_{tons\ c}$ $= Cremations_{c} \times Weight_{c}$ $\times \frac{1\ ton}{2,000\ pounds}$	2,384,006 cremated cats × 9.9 lbs per cat ÷ 2000 lbs per ton	11,800 tons of cremated cats in the U.S.
A3	$Cremations_{tons\ animal}$ $= Cremations_{tons\ c}$ $+ Cremations_{tons\ d}$	N/A	Cremation of dogs are not estimated in this sample calculation
A4	$Cremations_{tons\ animal,c}$ $= Cremations_{tons\ animal,US}$ $\times \frac{Pop_c}{Pop_{US}}$	11,800 cremated cats × $\frac{873\ people\ in\ Clark}{329,164,967\ people\ in\ US}$	0.03 tons cats cremated in Clark County, ID

Eq. #	Equation	Values for Clark County, ID	Result
A5	$Emissions_{p,c} = Cremation_{tons_c} \times EF_p$	$0.03 \times 0.0015 \text{ lbs per ton}$	0.000045 lbs. mercury emissions from cremation of cats in Clark County, ID

29.2.7 Improvements/Changes in the 2020 NEI

There are no significant changes from the methodology used to calculate the 2020 NEI emissions.

29.2.8 Puerto Rico and U.S. Virgin Islands

Since insufficient data exists to calculate emissions from human cremation for the counties in Puerto Rico and the US Virgin Islands, emissions are based on two proxy counties in Florida: 12011, Broward County for Puerto Rico and 12087, Monroe County for the US Virgin Islands. The total emissions in tons for these two Florida counties are divided by their respective populations creating a tons per capita emissions factor. For each Puerto Rico and US Virgin Island county, the tons per capita emissions factor is multiplied by the county population (from the same year as the inventory's activity data) which served as the activity data. In these cases, the throughput (activity data) unit and the emissions denominator unit are "EACH".

Emissions from animal cremation are based on county population; therefore, the emissions from animal cremation in Puerto Rico and the Virgin Islands are calculated using the method described for the rest of the counties.

29.3 References

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EXHIBIT

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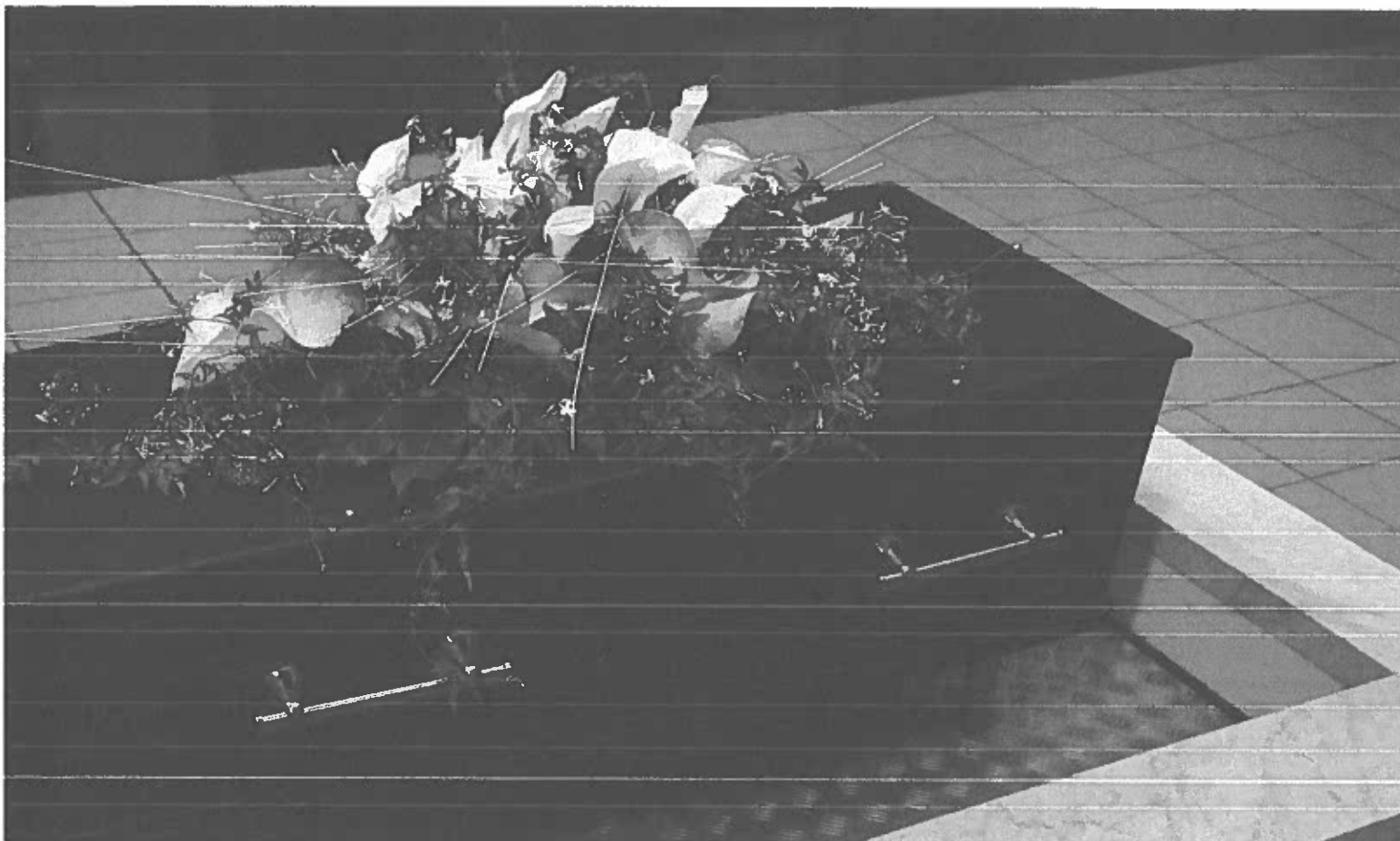
FIELD INQUIRY: CREMATORIA EMISSIONS AND AIR QUALITY IMPACTS



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for Environmental Health
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PRIMARY INQUIRY

A municipality received an application from a funeral home to install a cremator within their facility. Objections were received from nearby residents who were concerned about potential exposure to harmful emissions. A public health unit was contacted to help answer the following questions:

1. Do crematoria emit harmful pollutants?
2. Is there evidence of health impacts due to exposure to crematoria emissions?
3. What is standard practice for siting of crematorium in proximity to residential areas?
4. What steps can be taken to minimize crematoria emissions to reduce exposure risks?

BACKGROUND

In Canada, preference for cremation over burial has been increasing since the 1950s. The Cremation Association of North America (CANA) estimated that in 2016 approximately 70% of human remains in Canada were cremated, and this may rise to about 80% in 2020.^{1,2} The increased demand for cremation services can only be met by constructing new crematoria or expanding existing facilities. Both can be expected to lead to a rise in inquiries about potential health

risks to nearby communities. This field inquiry therefore focusses on crematoria-related air pollution and human health risks.

METHODS

A rapid literature search was undertaken for articles related to health and air quality issues and their association with combustion processes in crematoria. Articles were identified using EBSCOhost (Biomedical Reference Collection: Comprehensive, CINAHL Complete, GreenFILE, MEDLINE with Full Text, Urban Studies Abstract) and Google Scholar. Terms used in the search included variants and Boolean operator combinations of (cremat* OR "funeral home") AND (health OR illness OR irrita* OR annoy* OR emission OR "air quality"). Inclusion criteria were publication date (no date restriction), English language, and human subjects. Google was used to access relevant public agency websites and grey literature including Canadian public health documents concerning cremation facilities and examples of current practices elsewhere. Citation chaining was used to further expand the resource lists.

Disclaimer: The information provided here is for the purpose of addressing a specific inquiry related to an environmental health issue. This is not a comprehensive evidence review. The information offered here does not supersede federal, provincial, or local guidance or regulations.

1. Do crematoria emit harmful pollutants of public health concern?

Types of emissions

Cremation is a combustion process whereby a casket and human remains (or animal remains in pet crematoria) are incinerated at a high temperature in a closed chamber. Cremation in Canada is normally fuelled by gas and will produce emissions associated with fossil fuel combustion as well as emissions related to the material being combusted.^{3,4} This can include:

- **Combustion gases:** carbon monoxide (CO), nitrogen oxides (NO_x), sulphur dioxide (SO₂) and volatile organic compounds (VOC);
- **Particulate matter and fine dust:** PM₁₀ and PM_{2.5};
- **Organic pollutants:** Compounds resulting from incomplete combustion processes or formed when organic compounds react with chlorine in materials such as plastics. These pollutants can include polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) and polycyclic aromatic hydrocarbons (PAH) amongst others;
- **Heavy metals:** Mercury (Hg) arising from volatilization of Hg in dental amalgam in fillings and a small quantity of various metals in tissues of the individual, or personal memorial items included in the casket.

The pollutants of most concern are those known to be toxic to humans and which can bioaccumulate in tissues (e.g., PCDD/Fs and Hg) as well as fine particulate matter (PM_{2.5}), which can negatively impact the heart and lungs and is associated with some chronic illnesses and adverse birth outcomes.^{2,3,5-7} Evidence on the release of radioactive particles, following cremation of deceased patients who had been treated with radioactive substances (e.g., cancer treatments) has not been widely studied but has been raised as an emerging area of public interest and concern.⁸⁻¹⁰

Level of emissions

What is the % based on proximity. -

Crematoria are usually considered small-scale installations with relatively low total emissions compared to other types of incineration facilities such as municipal waste incinerators or industrial processes. Crematoria contribute approximately 5% of total PCDD/Fs, 6% of total Hg emissions and 0.25% of PM_{2.5} emissions in Canada^{3,11} These estimates are based on the number of cremations reported per year and pollutant-specific emissions factors for crematoria.^{12,13} Most large-scale facilities generating high levels of emissions will report to the National Pollutant Release Inventory (NPRI) for Canada. For the most recent year of reporting (2017), no human crematoria and only one pet crematorium reported to the NPRI. This particular facility processes a very large throughput of animal remains that is atypical of the volume processed at most human or pet crematoria.

The relative contribution of an individual crematorium to local air pollution will depend on the other potential sources of pollutants in the vicinity, the number of cremations and composition of the remains, the design of the system, the operation of the cremator, and emissions control measures, as described in Table 1.¹⁴ Table 2 summarizes the literature reporting measured ambient concentration (MA), predicted exposure (PE), or measured flue gas (MF) concentration of PCDD/Fs, Hg or PM_{2.5}. Most studies report measured concentrations of pollutants in flue gas only. Few studies of crematoria emissions have measured ambient concentrations of air pollutants or modelled the predicted exposures.

TABLE 1. FACTORS AFFECTING THE LEVEL OF POSSIBLE EMISSIONS FROM CREMATORIA

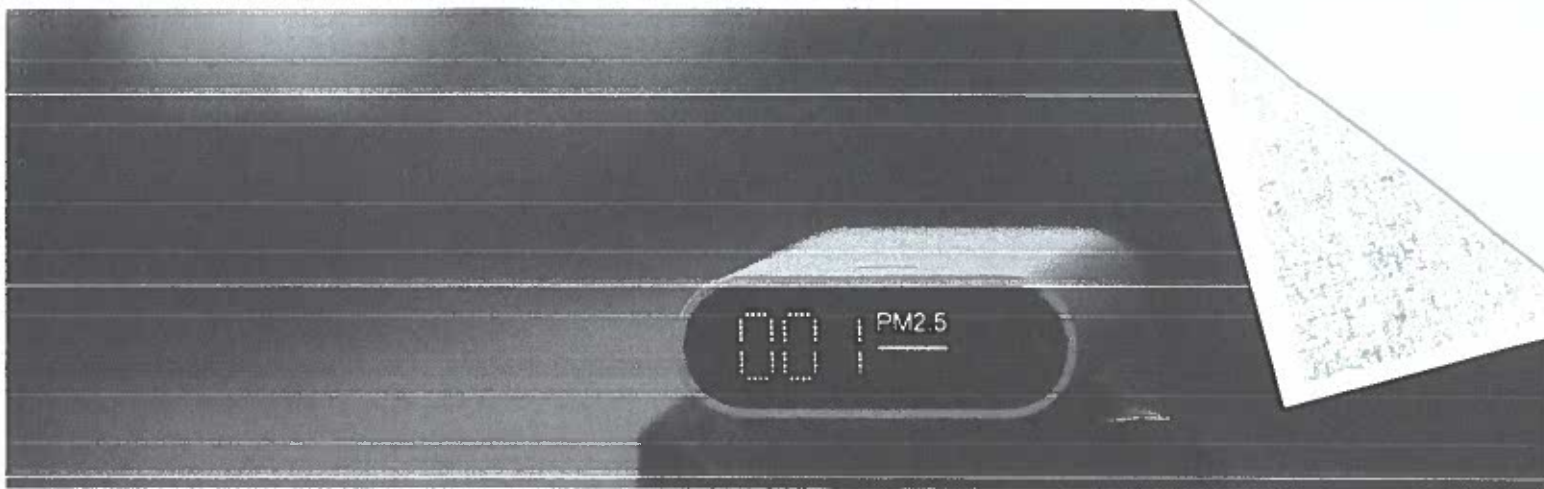
<p>The composition of the casket and remains</p>	<ul style="list-style-type: none"> • The size of the corpse can affect the initial combustion temperature, the duration over which emissions are released (1.5 to 5 hours), and the total quantity of emissions.¹³ • Hg emissions are affected by the presence of dental amalgam fillings containing Hg.² Up to 0.5 g of Hg is present per filling, some of which may be volatilized and emitted into the atmosphere.^{3,15} • Plastics or polystyrene parts in the funeral casket or personal/memorial items included in the casket can increase the potential for fine particulates and organic pollutants (e.g., PAHs and PCDD/Fs) to form within the combustion chamber.³ • Burial caskets coated in insecticides or preservatives can be a source of PCDD/Fs. Caskets made from untreated wood, cardboard, and similar materials release fewer harmful substances.^{16,17} • The presence of radioactive substances within the remains, either from devices or as a result of radiotherapy, could result in low levels of radiation or radioactive particles to be present in the combustion chamber.^{9,18}
<p>The design of the system</p>	<ul style="list-style-type: none"> • The presence of two combustion chambers in a cremator allows for high-temperature treatment of gases and particulates, which reduces released odours, fine dust, and products of incomplete combustion (PICs) such as PCDD/Fs. • Chimney height can affect the distribution and dilution of emissions into the atmosphere and dispersion at ground level.^{4,19} • Older equipment is less likely to be fitted with modern process controls and monitors and may be more prone to failure.^{20,21}
<p>Operational parameters of the cremator</p>	<ul style="list-style-type: none"> • Low start-up temperatures can cause incomplete combustion in the initial stages of cremation, resulting in release of particulates or PICs such as PCDD/Fs.²⁰ • High temperature (e.g., >850°C) and residence time (2 s) for gases in the second chamber can reduce the quantity of PICs released, as can ensuring sufficient O₂ for combustion (e.g., 6%).^{3,20} • Modern equipment with process controls and continuous monitoring of pollutants can alert operators of operational problems. High carbon monoxide (CO) levels can indicate inefficient combustion and potential formation of PICs. • Absence of monitoring can lead to failure to detect operator error or equipment failure, resulting in possible unintentional release of pollutants.
<p>Emissions control measures</p>	<ul style="list-style-type: none"> • Flue gas treatment, acid neutralization, activated carbon adsorption, dust collection, and good operation and maintenance practices can reduce emissions of key pollutants.^{4,14} • Measures that control the release of dust can reduce emissions of fine particulates and PCDD/Fs.^{16,19,20,22} • Hg-abatement equipment, such as activated carbon filters, scrubbers, and technologies that bind or precipitate Hg, are effective at reducing Hg emissions.^{23,24} • Removal of Hg at source by the removal of dental amalgams prior to cremation can be both cost and environmentally effective; however, it is less socially acceptable, and difficult to impose.²⁵

TABLE 2. EMISSIONS LEVELS FROM CREMATORIA POLLUTANT STUDIES

Study Location	Study Type	PCDD/Fs (ng TEQ/m ³)	Hg (µg/m ³)	PM _{2.5} (mg/m ³)
Taiwan ²⁶	MA	0.0005 (downwind of crematoria with no dust control)	n/a	n/a
New Zealand ²⁷	MA	n/a	110-120 µg/kg (downwind mean soil concentration)	n/a
Virginia, USA ²⁸	PE	0.0000008 (max exposure) 0.0000005 (nearest school)	0.003 (max exposure) 0.002 (nearest school)	n/a
Taiwan ²⁵	MF	0.32 (bag filter) 2.36 (no dust control)	n/a	n/a
Taiwan ²⁹	MF	0.14 (single crematorium)	n/a	n/a
Mexico ¹⁴	MF	n/a	n/a	11-35 (120 min cremation) 25-205 (70 min cremation) No dust control at either crematoria
Denmark ³⁰	MF	0.2-0.7 (2 crematoria)	n/a	n/a
Italy ³¹	MF	1.13, 1.10 (1 crematoria, 2 cremations)	2.8, 293, 76 (1 crematoria, 3 cremations)	2.2, 1.1, 1.9 (1 crematoria, 3 cremations)*
Japan ²²	MF	0.00005-11 (various levels of emissions control)	n/a	n/a
Japan ³²	MF	n/a	0.2-30.3 (average 3.6) (7 crematoria)	n/a
Example ambient air quality standards		< 0.1 (UNEP ³³)	2 (24-hour average) (Ontario AAQC ³⁴)	0.027 (24-hour average) (CAAQ ³⁵)
Reference exposure limits for acute (A), 8-hour (8) and chronic (C) exposure by inhalation³⁶		0.04 (C)	0.6 (A) 0.06 (8) 0.03 (C) (Hg, and inorganic Hg compounds)	

MA: measured ambient concentration; PE: predicted exposure concentration; MF: measured flue gas concentration; ng = nanograms; µg = micrograms; TEQ = toxic equivalency; n/a = not assessed

*total particulate matter



There is substantial variation in MF concentrations among the studies, illustrating how design, operation, and emissions control measures can significantly impact the levels of emissions released. Only one study measuring downwind ambient air concentrations of PCDD/Fs was identified but no studies measuring Hg or PM_{2.5}. One study reported downwind soil concentrations of Hg, which was detected up to 30 m away from crematoria sites. Other studies in Sweden³⁷ and Norway³⁸ have detected Hg in soils downwind of anthropogenic sources including crematoria, although the relative contribution and correlation with ambient air concentrations have not been reported.

Determining relative contribution of crematoria emissions to local air quality can be difficult. Some countries have set specific national pollution control regulations for emissions of Hg and other air pollutants from crematoria, but Canada has no such regulatory limits at a federal level.^{23,39} Canadian Ambient Air Quality Standards (CAAQS)³⁵ exist for PM_{2.5} but not for PCDD/Fs or Hg. Some provinces may use Ambient Air Quality Criteria (e.g., Ontario³⁴) or similar standards for these substances; however, attributing ambient exceedances to a single source can be difficult. Computational air dispersion modelling using local air conditions, geography, and emission factors can be used to predict exposure levels from a point source of pollution. This approach was used to estimate exposures concentrations from a crematoria in Virginia, USA, (Table 2) and found that PE was well below reference exposure limits for PCDD/Fs and Hg.^{12,28} Reports to local authorities for proposed crematoria also use this approach but may estimate emissions using manufacturers' reported emissions factors. Most reports found on public body websites using this approach identified minimal or no impact on sensitive receptors, but potentially harmful pollutants such as PCDD/Fs, Hg or PM_{2.5} were not always reported.^{39,40,41}

There are few studies that have assessed the release of radioactive particles from crematoria. In West Australia, an atmospheric dispersion study modelled Iodine-131 (¹³¹I) emissions following the cremation of a deceased cancer patient who had received a high dose of ¹³¹I shortly before death. The study estimated that environmental limits for atmospheric emissions of ¹³¹I could have been exceeded at distances of 440 m and 1610 m downwind of the chimney, but ambient ¹³¹I levels were not measured.¹⁰ Events such as this are unlikely to represent routine conditions, and following the Canadian Nuclear Safety Commission's Radiation Protection Guidelines for the Safe Handling of Decedents, should minimize radiation exposure for crematoria and other death care operators, as well as the release of radioactive particles into the environment.¹⁸

2. Is there evidence of health impacts due to exposure to crematoria emissions?

As mentioned in Section 1, the pollutants of most concern from crematoria emissions are PCDD/Fs, Hg and fine particulate matter (PM_{2.5}).^{2,3,5-7} PCDD/Fs and Hg are known to be toxic to humans and can bioaccumulate in tissues. PCDD/Fs are classified as possible human carcinogens and Hg is a neurotoxin. Exposure to PM_{2.5}, which can reach deep into the lungs, can increase the risks of heart disease, lung cancer, asthma, and adverse birth outcomes, and exacerbate other conditions such as diabetes. For these key pollutants, agencies such as the World Health Organization (WHO) and the United States Environmental Protection Agency (USEPA) advise that care should be taken to limit exposure, particularly for vulnerable populations such as babies, children, pregnant women, and the elderly.

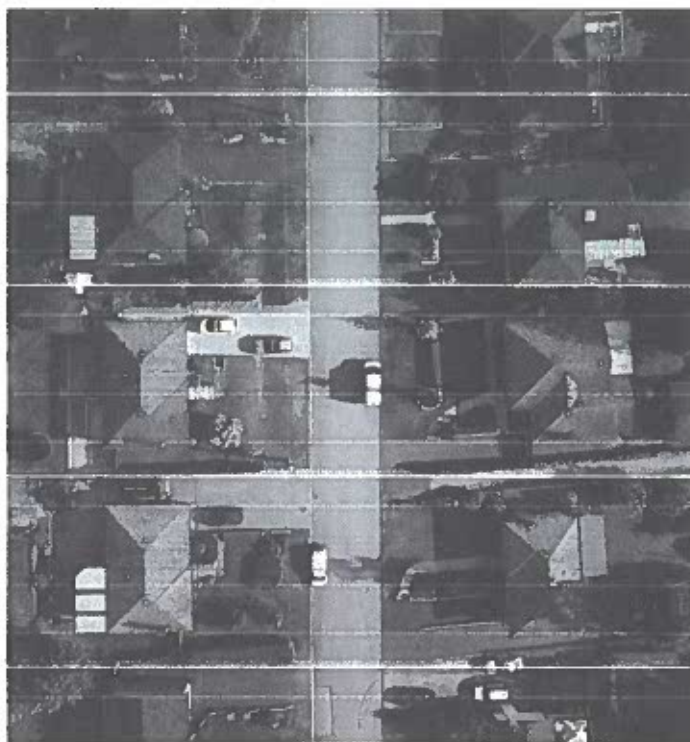
The level of exposure to these pollutants caused by crematoria has not been widely studied. A review of the literature found only one study that investigated

health outcomes amongst residents living in proximity to crematoria. The study assessed the risk of stillbirth, neonatal death, and lethal congenital anomalies among babies of mothers living close to incinerators or crematoria in Cumbria, England, between 1956 and 1993.⁴² An increased risk of stillbirth and anencephalus was found to be associated with residential proximity to crematoria; however a causal effect could not be inferred. In this study, the distance between a residential postcode and a crematorium was used as a surrogate for exposure. Some of the crematoria were located near industrial sites where other pollution sources may have been present, but neither emissions levels from crematoria nor ambient concentrations of pollutants at receptor properties were measured.

The health impacts of living in proximity to waste incineration facilities have been more widely studied than crematoria. Waste incinerators tend to be much larger-scale installations, and also have more varied inputs than crematoria, but these facilities also produce combustion emissions including trace metals, particulates, and organic compounds such as PCDD/Fs. A review of the literature from 2012 on the health impacts of thermal treatment of municipal solid waste (MSW) around the world found that living in close proximity to older MSW incinerators with high

dioxin emissions (e.g., 16-80 ng/m³ TEQ) was associated with adverse health outcomes including congenital anomalies and non-Hodgkin's lymphoma.⁴² These levels exceeded all those recorded for crematoria (Table 2) as well as permitted dioxin emissions levels in Canada and Europe (0.05-0.50 ng/m³ TEQ). These incinerators also represent much larger point sources of pollutants compared to crematoria, processing in excess of 100 times the quantity of material per day.

Other studies assessing health effects of crematoria emissions have considered occupational exposures to Hg, dust or radiation.^{9,44,45} The occupational exposure studies identified do not link exposures to any adverse health outcomes. Exposure to Hg has been found to be higher amongst crematoria staff than in a control population, and exposure to fine particulates may occur, particularly where there are no operational and engineering controls to reduce exposure to dust.^{44,45} A recent occupational exposure study following the cremation of a deceased patient treated with a radiopharmaceutical Lutetium-177 (Lu¹⁷⁷) found no trace of the radioactive substance in the urine of the crematorium operator but detected radiation within the crematorium and presence of another isotope in the employee's urine, suggesting possible exposure on a previous occasion.⁹



3. What is standard practice for siting of crematorium in proximity to residential areas?

Table 1 identifies the many factors affecting emissions from crematoria. Ground level concentrations can also be affected by local prevailing wind direction and topography. In North America, there are no standard requirements for crematoria setback distances and no minimum separation distances are set at a federal level in either the US or Canada. Crematoria are regulated at the provincial/territorial level and regional or municipal authorities determine whether minimum setbacks are required based on relevant planning and environmental considerations. The literature search for public agency resources and grey literature identified many different practices, with some selected examples from around the world listed in Table 3.

TABLE 3. SELECTED EXAMPLE SETBACK DISTANCES FOR CREMATORIA FROM AROUND THE WORLD

England and Wales (UK Cremation Act)⁴⁶	200 yards (183 m) between a crematorium and any dwelling house and 50 yards from a public highway to protect residents from nuisance smoke and fumes and provide privacy to funeral proceedings
West Australia⁴⁷	200-300 m between crematoria and sensitive land uses
South Australia and the Australian Capital Territory^{48,49}	150 m minimum separation distance
South Africa, Department of Health⁵⁰	500 m from any habitable building
US (Sacramento County, California)⁵¹	500 feet (152 m) from any agricultural-residential, residential, or interim residential zoning district

In Canada, there is a range of local zoning practices establishing permitted and prohibited locations for crematoria as well as other restrictions or specifications for setback distances. For example, in Ontario, the minimum separation distances (MSD) and the potential area of influence (AOI) for crematoria depend on whether the local permitting authority classify a crematorium as a Class 1 (e.g. MSD of 20 m, and AOI of 70 m) or Class 2 facility (e.g. MSD of 70 m, and AOI of 300 m).^{40,52} Elsewhere, crematoria may be permitted in conjunction with a cemetery or in specified zones (Industrial) with minimum separation distances between crematoria and sensitive receptors such as schools, daycares, libraries, or care facilities (e.g., 30-60 m).^{53,54} Setback distances are not specified in all jurisdictions, and in these places, the siting of crematoria may be at the discretion of local authorities.

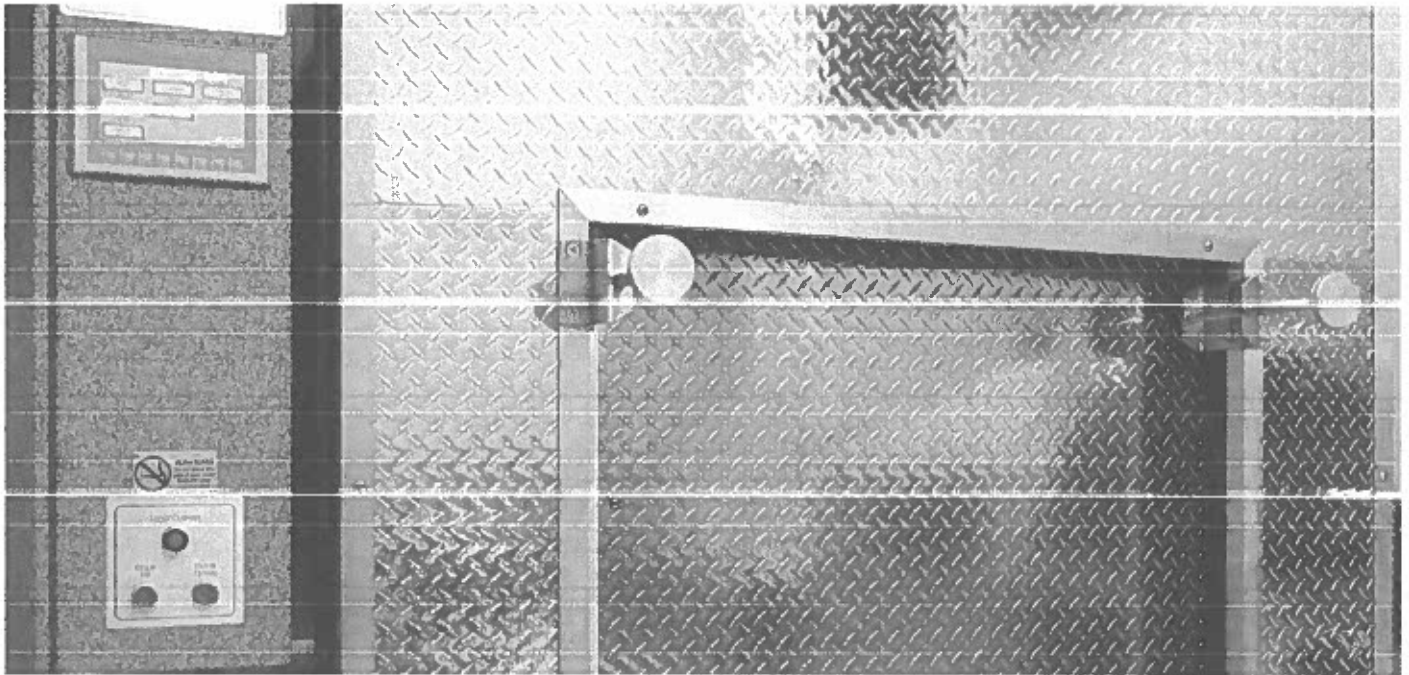
4. What steps can be taken to minimize crematoria emissions to reduce exposure risks?

While there are limited studies on the health effects due to crematoria emissions specifically, the wider body of literature on the negative health effects due to exposure to substances such as PCDD/Fs, Hg and PM_{2.5} indicate that best practice measures should be adopted to minimize the risk of exposure to these pollutants. In addition to local planning and zoning bylaws, regulation of crematoria varies by province, with oversight government authority ranging from consumer protection to environment or public health ministries. Typically, ambient air quality monitoring around crematoria is unlikely to be required due to the small size of

the installations and the need to comply with other specific regional requirements for crematoria.

In BC, the provincial regulator of crematoria is Consumer Protection BC, under The Cremation, Internment and Funeral Services Regulations. The Regulations require an initial engineering report to support operation of a crematorium, certifying that the crematorium complies with manufacturer's specifications, local bylaws, and provincial laws (see Crematory Technical Checklist). The Regulations also prohibit the use of plastics, fiberglass, foam, Styrofoam, rubber, PVC and Zn in funeral containers to reduce harmful emissions.⁵⁵ In Ontario, Environmental Compliance Approval through the Ministry of Environment, Conservation and Parks is required prior to replacement or construction of human and pet crematoria to address concentrations of air pollutants on and beyond a cemetery property under normal operations. Conditions of operation and limits for emissions and potential nuisance from odour or noise may be placed on the crematoria to minimize local impacts. This can include continuous monitoring for parameters such as CO, as an indicator of combustion efficiency, which can affect the emissions of organic pollutants. In the Northwest Territories, under proposed elements for the Cremation Regulations, the Chief Public Health Officer will consider applications for crematoria and determine if proposed processes are safe. Applicants will be required to provide equipment specifications, design features, operational methods, control measures for reducing exposure to harmful microorganism and chemical hazards, and additional treatment processes.⁵⁶ In Quebec,

the *Environmental Quality Act Clean Air Regulation* sets specific requirements for crematoria including device design and operational parameters. Monitoring measures are also specified, with a requirement to test emissions of gases into the atmosphere and calculate particulate concentration within a year of installation, and at least once every five years thereafter.⁵⁷



BEST PRACTICE GUIDELINES

The Secretariat of the Stockholm Convention on Persistent Organic Pollutants has published best practice guidelines for crematoria.³³ These align with other recommendations cited throughout the literature.¹⁹ The key recommendations include:

- Minimum furnace temperature (850 °C), residence time in the second chamber (2 seconds for combustion gases) and enough air (e.g., 6% O₂ by volume) to ensure combustion in the second chamber and avoid generating products of incomplete combustion;
- Suitable air pollution control equipment, which could include temperature controls, dust control, carbon injection, fabric filtration, air tightness of combustion chambers and casings;
- Monitoring of gas temperature and flue gas O₂ and CO concentrations, application of relevant emission limit values and additional monitoring, including ambient monitoring of soil and air in the proximity of crematoria;
- Avoidance of use of PVC, metals and chlorinated compounds in coffins and fittings;
- Operational controls, inspection and preventive maintenance.

Additional legislative measures can be effective in reducing emissions. For example, in Europe, Hg emissions from crematoria were reduced following the implementation of Hg abatement requirements.²³ Other good practice measures to protect crematoria workers, such as removal of radioactive implants before cremation, informing crematoria workers of recent radiotherapy treatments for deceased patients, and safe handling practices for ashes, can also reduce possible environmental releases of pollutants.^{3,18,44} The removal of dental amalgams prior to cremation has been proposed as a measure to significantly reduce emissions of Hg but may be difficult to impose.

A summary of the influence of various control measures on the key pollutants of interest is presented in Table 4.

TABLE 4. EFFECTIVENESS OF VARIOUS CONTROL MEASURES ON REDUCING POLLUTANT RELEASE FROM CREMATORIA

	PCDD/ Fs	Hg	PM _{2.5}	Radioactivity
Source control				
Removal of plastics, etc.	✓		✓	
Non-toxic and eco-friendly coatings or materials in caskets	✓			
Removal of Hg fillings		✓		
Removal of medical devices containing radioactive substances				✓
Operational controls				
Minimum 850°C (2 nd chamber)	✓		✓	
Minimum residence time of 2 s (2 nd chamber)	✓		✓	
Adequate O ₂ in combustion chamber	✓		✓	
Monitoring CO releases	✓		✓	
Air tightness of combustion chambers and casings	✓	✓	✓	✓
Maintenance and inspection	✓	✓	✓	✓
Operator training	✓	✓	✓	✓
Emissions controls				
Dust control (filters and scrubbers)	✓		✓	
Activated carbon treatment	✓	✓		
Hg removal technology (binding, precipitation etc.)		✓		
Adequate chimney height	General dispersion and dilution of pollutants higher into atmosphere			

✓ indicates the measure can help reduce emissions

SUMMARY

Combustion processes can generate potentially harmful pollutants such as organic compounds (PCDD/Fs), Hg, and fine particulates (PM_{2.5}). While these substances have been associated with a range of adverse health effects, no studies have been found that show causal links between crematoria emissions and adverse health effects. The absence of emissions data for crematoria and ambient air quality monitoring in the vicinity of installations limits the ability to fully assess exposures and health impacts. A precautionary approach could be adopted that includes following best practice recommendations for design, operation, monitoring and maintenance of crematoria.

There is no standard practice across Canada for emissions controls, monitoring or crematoria setback distances, but there are specific requirements set at regional and local levels. Appropriate setback requirements and other controls should consider equipment type, size, number of proposed cremations, local climate conditions, local land use and zoning and proximity to sensitive receptors on a case-by-case basis. Communication with the public about potential impacts and risk reduction strategies early in the development process can help to address concerns and inform appropriate siting, operational controls and monitoring.

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PCDD/Fs are classified as possible human carcinogens and Hg is a neurotoxin. Exposure to PM_{2.5}, which can reach deep into the lungs, can increase the risks of heart disease, lung cancer, asthma, and adverse birth outcomes, and exacerbate other conditions such as diabetes. [Mar 24, 2020](#)

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The process of corpse cremation generates numerous harmful air pollutants [[1-3](#)], including particulate matter (PM), SO₂, NO_x, CO, HCl, HF, NH₃, VOCs, heavy metals, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) [[4-8](#)]. Due to the characteristics of the funeral sector, the chimney heights are usually low, and the air pollutants disperse close to the ground, thus severely affecting the surrounding air quality and human health

CANADIAN JOURNAL OF PUBLIC HEALTH

Mercury from crematoriums: human health risk assessment

In British Columbia - 12/2020

Acute exposure to high concentrations of elemental mercury vapour, such as workers who were exposed to 0.79 mg/m³ for 1.5 years, 0.9 mg/m³ for over 5 years, and 0.014–0.076 mg/m³ for over 15 years, or in cases that are exposed for a longer period such as in occupational settings, may be followed by chest pains, dyspnea, coughing, hemoptysis, and sometimes interstitial pneumonitis leading to death (Friberg [1991](#); Asano et al. [2000](#); Fields et al. [2017](#); Lien et al. [1983](#)).

Once mercury is released, it may undergo further conversion by microorganisms to methylmercury, generally regarded as the most toxic form of mercury. Methylmercury bioaccumulates and biomagnifies in the

food chain, reaching its highest concentrations in long-lived predatory species.

In fish and other animals, methylmercury is associated with adverse behavioural, neurochemical, hormonal, and reproductive effects. Consumption of fish is the primary route by which humans are exposed to methylmercury, and exposure produces similar adverse biological effects. Of particular concern are the effects of methylmercury on neurological development (Friberg [1991](#); Antunes Dos Santos et al. [2016](#); Hong et al. [2012](#)).

Mercury release from crematoriums is generally unregulated in North America. Regulatory Framework for Air Emissions, Canada, does not specifically discuss highly toxic mercury as an air pollutant from crematoriums (Regulatory Framework for Air Emissions [2007](#)). Mercury release from crematoriums is also not subject to licensing and regulatory frameworks provided in Cremation, Interment and Funeral Services Act and Regulation (Cremation, Interment and Funeral Services Act [2004](#); Cremation, Interment and Funeral Services Act [2016](#)) and funeral association policies and regulations in British Columbia (British Columbia Funeral Association [n.d.](#)).

The concentration of mercury in cremation exhaust is rarely measured in North America; instead, emissions factors are typically employed to estimate the quantity of mercury emitted during cremation. A factor commonly used is that developed by the United States Environmental Protection Agency (EPA): 3.29×10^{-3} lb (1.49 g) per each body cremated, based on emissions testing conducted at a single propane-fired incinerator in 1992 (US Environmental Protection Agency [2017](#)). The representativeness of this factor, however, is limited due to spatial and temporal variations in dental amalgam use; the amount of mercury per person varies considerably with the number and mass of amalgam fillings. Some have thus used oral health data specific to the region of interest in order to estimate the amount of mercury present in cremated bodies. In Minnesota, for example, researchers reviewed the dental records of 1000 subjects between the ages of 63 and 79 and estimated a

mean mass of mercury per person of 2.3 g (Myers [2015](#)). In the absence of source-specific data, the United Nations Environment Programme recommends the use of default “low-end” and “high-end” emissions factors of 1 g and 4 g, respectively, per body cremated, based on a review of data from North America and Europe (United Nations Environment Programme [2017](#)).

Air pollutant emission inventory report by Environment and Climate Change Canada estimated that total air pollutant emission of mercury could reach 280 kg (Air Pollutant Emission Inventory Report [1990](#)). In BC, using the US EPA emissions factor, Environment and Climate Change Canada estimates that 42.9 kg of mercury was emitted to the atmosphere from crematoriums in 2015. Given the above, it is reasonable to expect that mercury emissions from crematoriums in the province may actually be substantially higher.

Crematoriums are sources of air pollution including mercury emission and may cause plausibly subtle chronic health effects due to long-term low-dose exposure. Characterizing the nature and strength of the evidence of causation and dose-response assessment are needed from a health perspective

Toxic atmospheric pollutants from crematoria ovens: characterization, emission factors, and modeling | Research Article | [Published: 01 August 2020](#) | volume 27, pages43800–43812 (2020)

Abstract

Human remains and corpses' cremation is an increasing practice worldwide alternative to burials, which have increased their cost and reduced spaces in cemeteries. Alike to other combustion processes, cremation produces pollutant emissions that contribute to worsen air quality in modern cities. A 6-month sampling campaign was

performed in order to characterize emissions from corpse cremation in three different crematorium ovens and develop emission factors which were used to determine the population exposure to those pollutants during cremation activities applying a dispersion model.

The main difference among crematoria *was the inclusion or non-inclusion of controlled air supply devices*. Using isokinetic samplings in the chimneys crematoria, emissions were measured and characterized with different chemical analyses. No significant differences were found in arsenic and metal concentrations among different crematories, although carbon monoxide, particles, elemental carbon, organic carbon, and polycyclic aromatic hydrocarbon concentrations in facilities without controlled air supply were up to seven times higher than those with controlled air supply. Nevertheless, these pollutants exceeded standards in all crematoria. Except for elemental and organic carbon concentration that correlated with corpse weight, other recorded cadaver characteristics bear no relation with pollutant emissions.

Cremation Assoc. of North America

<https://www.cremationas>

COMMON EMISSIONS REGULATIONS

Cremation laws, regulations, and licensing on emissions are managed at the state/provincial and local levels. While the specific rules vary widely among the states and provinces, generally:

1. **Visible particulate matter, or smoke, is an actionable concern.** Crematory equipment is designed to minimize particulate matter emission, but, as covered below, many factors contribute to emissions. If the public has concerns about smoke or emissions emanating from the crematory, the state or municipality has jurisdiction to investigate on behalf of the public.
2. **The burden of providing emission data falls to the manufacturer via the crematory owner.** When a crematory owner installs or updates a cremator, they will be required to submit emission data or conduct a study on their property to the regulating body(ies). Emission studies are referenced when issuing air permits that determine the operating

restrictions within which crematories must function. The air permit may reference operating hours; pounds cremated per day, week or month; and other zoning variances or conditions.

3. **Different regions within the US have different standards and concerns about emissions.** For example, **Great Lakes states and provinces** focus heavily on reducing mercury emissions, while the **California and the west coast** looks at nitrous oxide (NO_x) and other carcinogenic chemicals generated via combustion. The good news for consumers is that machines are manufactured to meet emission standards in every state and province, so they generally exceed local standards.

WHAT IS THE ENVIRONMENTAL IMPACT OF CREMATION TODAY?

We know that the environment is on everyone's minds, not to mention the safety of our communities. There are many factors that play a part in **crematory operations** and emission. For example, the science of combustion accounts for the fuel sources – the gas that powers the cremator, residual heat from previous cremations, the plant matter of the casket/container, the tissues of the body, and the oxygen in the air – to get as close to Complete or Perfect Combustion as possible, resulting only in carbon monoxide (CO) or dioxide (CO₂), sulfur dioxide (SO₂) and water (H₂O). Complete Combustion is impossible since there are so many variables to manage throughout the cremation process, but modern cremators, and best practices in the crematory, get as close as possible.

In addition to combustion, there are other variables that impact emissions, including:

- Clothing and keepsakes placed in the cremation container along with the deceased human or pet body
- Implants, dental fillings and crowns, prosthetics, and eyeglasses
- Cremation containers, which are generally required and may be constructed from materials ranging from a plastic body bag, cardboard container, plywood, willow, or bamboo to highly varnished wood caskets, as well as a combination of containers (e.g., a body bag in a cardboard container or casket, a casket in a plywood air tray container for shipping, etc.)
- The age of the cremator, number of cremations per day, maintenance practices, etc. can all contribute to fuel efficiency and the resulting carbon footprint of cremation.
- Filtration Equipment, which is required in Europe but not in North America. Some businesses have opted to install filtration equipment to address community concerns or lessen environmental impact. Filtration equipment can be added to some existing machines to better monitor and limit emissions, but this is a business decision rather than a requirement.

Was this discussed w/ Robert?

Town of Carthage
Board of Commissioners



MEMORANDUM

Date: January 11, 2024
To: The Board of Commissioners
From: Emily Yopp, Town Manager/Allen Smith, Public Works Director
Subject: PHASE 2 SEWER CONSTRUCTION FUNDING ALTERNATIVE SUMMARY

SUMMARY OF REQUEST:

LKC Engineering has completed a comparison of available construction & funding alternatives for the second phase of the improvements to the sewer interconnection with Moore County with the goal of determining the best funding option for the project. The comparison considers using a combination of recent state grant (\$10,000,000 total) and USDA – Rural development loan / grant funding to complete the project. This could allow a significant portion of the state grant to be used for other water & sewer needs in town. LKC has provided two scenarios for construction alternatives for the Board to consider.

SUGGESTED MOTION(S):

OPTION 1

I make a motion to approve Construction Alternative #1 as written and presented by LKC Engineering.

or

OPTION 2

I make a motion to approve Construction Alternative #2 (Phase 2a) as written and presented by LKC Engineering.

or

OPTION 3

I make a motion to **deny** either Construction Alternative as presented by LKC Engineering for the following reason(s):

PHASE 2 SEWER IMPROVEMENTS
FUNDING ALTERNATIVES SUMMARY

JANUARY 16, 2024

LKC Engineering has completed a comparison of available construction & funding alternatives for the second phase of the improvements to the sewer interconnection with Moore County with the goal of determining the best funding option for the project. The comparison considers using a combination of recent state grant (\$10,000,000 total) and USDA – Rural development loan / grant funding to complete the project. This could allow a significant portion of the state grant to be used for other water & sewer needs in town.

The Phase 2 Interconnection Improvements project includes replacement of the Hwy 22 pump station near the intersection of S. McNeill Street and Pinehurst Avenue, new 12-inch forcemain from this new pump station to Cox’s pump station near the intersection of 15-501 and Hwy 22, replacement of Cox’s pump station, and installation of new 16-inch forcemain from Cox’s pump station to the new McCaskill pump station. The project would also include relocating pumps from the existing Cox’s pump station to the Lagoon pump station to convert it to a submersible station. There are two feasible alternatives for the construction of the Phase 2 project and these are summarized below.

Construction Alternative #1: This alternative would complete all the phase 1 project as described above. Updated estimates of the project cost total \$12,072,000.00.

Construction Alternative #2 - Phase 2a: This would include dividing the phase 2 project into two additional phases and building the first feasible phase. The first phase would include construction of the new Cox’s Pump Station and 16-inch forcemain to the McCaskill Pump Station. The total project cost of this alternative is estimated to be \$6,756,000. Phase 2b would include the Hwy 22 pump station and 12-inch forcemain and would be completed in a future project. Capacity in the newly upgraded Hwy 22 pump station is adequate for approximately 250,000 gallons of additional capacity.

Funding alternatives consider using a combination of loan and grant from USDA and state earmark funding for each construction alternative. This combined funding approach appears to be the best alternative for completing the most important sewer improvements and allowing for completion of needed water system projects too. In order to use combined funding, the pump stations and forcemains would need to be completed in separate projects to provide clear delineation of work. New USDA buy American requirements make using USDA funding for the forcemain construction and state earmark funding for the pump stations the most feasible option. Table 1 on the following page summarizes the funding breakdown.

Based on feedback from USDA, the Phase 2 project will not be eligible for a high grant percentage like the Phase 1 project was. Resulting debt service amounts make Construction Alternative #2 seem most feasible and could be completed with state grant funds only. Using USDA funding for the Phase 2A forcemain would allow the majority of the State Earmark grant to be used for other needed water & sewer improvements and is worth serious consideration. In addition, using USDA funding to complete the forcemain would allow the Town to use leftover funding (about \$400,000) from the Phase 1 project to purchase pipe needed in Phase 2a.

TABLE 1: FUNDING SCENARIOS FOR CONSTRUCTION ALTERNATIVES

Description	Total Estimated Cost	Potential DEQ Earmark Funding	Potential USDA Funding Amount ¹	USDA Debt Service (100% Loan)	USDA Debt Service (25% Grant)
Alternative #1: Includes Construction Alternative #1 (full Phase 2 project). USDA would be used for the forcemain construction and DEQ funding used for the Pump Stations.	\$12,072,000.00	\$3,537,000.00	\$8,535,000.00	\$400,000.00	\$300,000.00
Alternative #2: Includes Construction Alternative #2 (Phase 2a) with USDA Funding used for the proposed forcemain. The Hwy 22 Pump Station and forcemain to Cox pump station (Phase 2B) would be completed in a future project.	\$6,756,000.00	\$2,000,000.00	\$4,756,000.00	\$223,000.00	\$168,000.00

¹ Potential USDA Funding Amount includes using \$400,000 from leftover Phase 1 funding for purchase of pipe to be used in Phase 2

Phase 2 Sewer Capacity Improvements Project Location Map - Preferred Alternative Town of Carthage, NC



Proposed Lagoon Pump Station Upgrade

Proposed Hwy 22 Pump Station Replacement















Proposed Cox Pump Station Replacement

Proposed 12" Forcemain from Hwy 22 PS to Cox PS

Proposed 16" Forcemain from Cox PS to McCaskill PS

McCaskill Pump Station

Legend

- | | |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|  12-inch |  Pump Station |
|  16-inch |  Town Limits |
|  Phase 1 Forcemain | Gravity |
| Existing Forcemain |  6-inch |
|  6-inch |  8-inch |
|  8-inch |  10-inch |
|  10-inch |  12-inch |
|  14-inch | |
|  18-inch | |



Town of Carthage
Board of Commissioners



MEMORANDUM

Date: January 15th, 2024
To: The Board of Commissioners
From: Jamie Sandoval, Management Analyst
Subject: Review Current Strategic Goals

SUMMARY OF REQUEST:

Last year, the Board of Commissioners adopted their Strategic Plan (attached to this memo). Due to budget season approaching and Town Administrative Staff working internally to prepare adopting their own Goals and Mission Statement, it is important that the Board of Commissioners revisit their Strategic Plan. The Board of Commissioners should review and discuss whether the goals have shifted, if new goals are necessary, and if the Town has met some goals that were a priority and are no longer a priority in the coming 2023-2024 year.

If the Board of Commissioners finds that there are new goals that need to be addressed or added, it is important to make those goals known for Town Staff to revise the current Strategic Plan.

SUGGESTED MOTION(S):

OPTION 1

I make a motion to keep the Strategic Plan as is with no changes.

OPTION 2

I make a motion to make the following changes/suggestions to add to the existing Strategic Plan:



TOWN OF CARTHAGE
STRATEGIC
PLAN
2022-2025

Prepared by Town Staff

Strategic Goals set by the
Board of Commissioners
during a Strategic Planning
Session held August 20, 2022

Overview of Strategic Plan

Goal 1: Improvements to all Town Parks.

Goal 2: Promote manufacturing of goods, to include agricultural goods, in Carthage

Goal 4: Create partnership with Moore County focused on developing Carthage in a way that benefits both County and Town stakeholders.

Goal 3: Promote and support current and new small- and veteran-owned businesses.

Goal 6: Continued growth in the residential and commercial development sectors but with limitations on density and infrastructure growth.

Goal 5: Actively work to bring a byway or truck route to primarily reduce large truck traffic through Carthage.

Goal 7: Review of all General Ordinances to ensure they are current and supportive of the Board of Commissioner's strategic goals.



Purpose of Strategic Plan

Adoption of these strategic goals were made by the Board of Commissioners in accordance with other Town plans such as the Bike and Pedestrian Plan and the 2040 Land Use Plan.

The purpose of this strategic plan is for the Town of Carthage, both the Board of Commissioners and Town Staff, to have guidance for future plans and objectives to enhance the Town of Carthage and to enhance the quality of life for Carthage residents.

These strategic plans were made with the intent to guide Town Staff in accordance with the goals from the Board of Commissioners.

Goal 1: Improvements to All Town Parks

General Goals:

1. Replace aging equipment at Nancy Kiser Park
2. Develop the park to be able to host community events (i.e. music concerts, movies, food trucks, festivals, etc.)
3. Install equipment at Needmore Park

Town Staff Goals:

1. Get estimates and pricing to replace current equipment.
2. Contract out work for installing new equipment.
3. Event planning for community events and possibly fundraise for park improvements.

Goal 2: Promote Manufacturing of Goods including Agricultural Goods in Carthage

General Goals:

1. Ensure planning and zoning ordinance and maps allow space and ease of use for small manufacturing sites as well as agriculturally based manufacturing (i.e. products made from livestock or farming in general).
2. Town support services for agricultural-based businesses in rural areas of Carthage.
3. Brick and mortar store front space is limited in Carthage. Acquire space for development of large pavilion where a "market" can be established to give small businesses a place to sell their products.

Town Staff Goals:

1. Go through Town Ordinances and UDO to allow for more agricultural uses in different zones or to relax current ordinances.
2. Encourage and participate in more outreach for agricultural businesses.
3. Look into spaces for a potential farmer's market and/or host a monthly/annual farmer's market.

Goal 3: Promote and support current and new small- and veteran-owned businesses.

General Goals:

1. Outreach to existing and new coming businesses and identify what their needs are.
2. Discover new ways to support local businesses such as nonprofits and other organizations or programs.
3. Keep consistent communication with business owners.

Town Staff Goals:

1. Be present at meetings where Town Staff is needed to identify needs of small, local businesses.
2. Outreach to nonprofits and organizations to allow for new programs to be kickstarted for promotion of small- and veteran-owned businesses.
3. Consistent outreach and partnership with business owners about needs and promotion for their businesses.

Goal 4: Facilitate Partnership with Moore County that benefits both County and Town Stakeholders.

General Goals:

1. Development of small businesses and support services for all.
2. Well-planned growth in the downtown core.
3. Property acquisition and development to benefit Carthage citizens and businesses as well as visitors to Carthage using County services.

Town Staff Goals:

1. Host several meetings with Moore County and other municipalities to create new partnerships.
2. Communicate with Moore County the Town's plans for creating a vibrant downtown-core area.
3. Look into potential sites for purchase to develop Carthage along the downtown areas and the thoroughfare corridor.

Goal 5: Actively work to bring a byway/truck route to primarily reduce large truck traffic through Carthage.

General Goals:

1. Truck traffic through Town, especially the downtown core, should be reduced to allow for increased pedestrianism and public safety.
2. Reduction in traffic will contribute to the preservation and safety of historic buildings around the Courthouse Square.
3. Rerouting of truck traffic will alleviate congestion around the circle leading to a more comfortable environment for citizens shopping/visiting or using County government services.

Town Staff Goals:

1. Create a Resolution for the Board of Commissioners stating a need/desire for a bypass/truck route.
2. Work with NCDOT to find best options for bypass/truck route.
3. Host public meetings to discuss a bypass/truck route to gather public opinion and support.

Goal 6: Continued growth in both residential and commercial development but with limitations on density and infrastructure growth.

General Goals:

1. Develop the water and sewer infrastructure to accommodate growth as needed.
2. Complete review of the Unified Development Ordinance to ensure standards and regulations are in line with smart, well-planned, and well-placed growth.

Town Staff Goals:

1. Work with stakeholders for water and sewer infrastructure.
2. Revise and update Unified Development Ordinances that deal with residential growth and commercial growth.
3. Create a Resolution for specific allocations for water/sewer usage to commercial use only.

Goal 7: Review of all General Ordinances to ensure they are current and supportive of the Board of Commissioner's strategic goals.

General Goals:

1. Repeal ordinance(s) that prohibit skating/skateboarding in Town public parks.
2. Amend the Special/Temporary Event ordinance to allow more frequent community events.
3. Ensure ordinance is not prohibitive of small business development.

Town Staff Goals:

1. Revise and update outdated ordinances in both the Town Ordinances and the Unified Development Ordinances.
2. Present these updates during the Board of Commissioners' meetings to be amended.

Strategic Plan Quick Reference Guide

Goal 1: Town of Carthage Park Improvements

Town's Staff: Equipment estimates / install new equipment / fundraise.

Goal 2: Promote Agricultural and small businesses

Town Staff: Update UDO for adequate zones / outreach / host farmer's markets

Goal 3: Support Small- and Veteran-owned Businesses

Town Staff: Outreach/ Create Programs / Consistent Partnership

Goal 4: Create partnerships with Moore County and other municipalities.

Town Staff: Host meetings / strengthen communication / property acquisition

Goal 5: Work on obtaining a byway/truck route around Carthage.

Town Staff: Resolution / Work with NCDOT / Host public input meetings

Goal 6: Enhance Smart-growth initiatives to bring more commercial business.

Town Staff: Work with stakeholders / Update UDO / Resolution for allocations

Goal 7: Review and Update General Codes and the Unified Development Ordinances.

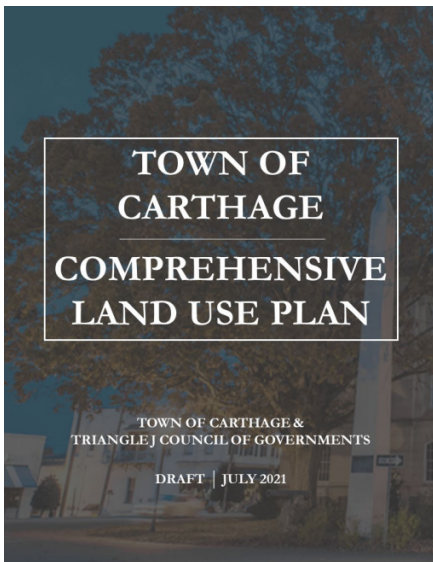
Town Staff: Revise Ordinances / present at meetings

The purpose of this strategic plan is for the Town of Carthage, both the Board of Commissioners and Town Staff, to have guidance for future plans and objectives to enhance the Town of Carthage and to enhance the quality of life for Carthage residents.

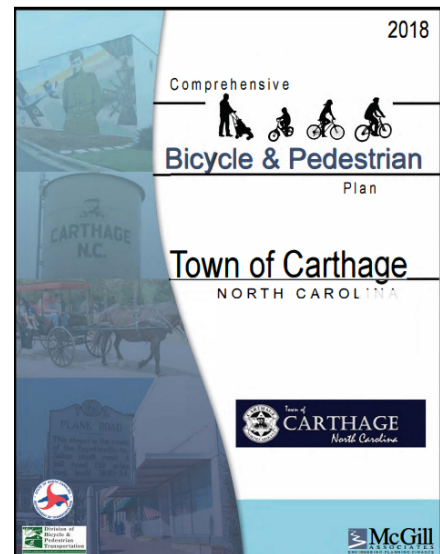
Additional References:

**PLANS CAN BE FOUND ON OUR WEBSITE
AT WWW.TOWNOFCARTHAGE.ORG**

Town of Carthage Bike and Pedestrian Plan



Town of Carthage 2040 Land Use Plan



CONTACT US!

Jamie Sandoval - Management Analyst/Planning Assistant:
jmsandoval.admin@townofcarthage.org
Emily Yopp - Town Manager:
townmanager@townofcarthage.org

Town of Carthage
Board of Commissioners



MEMORANDUM

Date: January 11, 2024
To: The Board of Commissioners
From: Kim Gibson, Town Clerk
Subject: Request to Surplus Public Works Items/Equipment

SUMMARY OF REQUEST:

Public Works Director, Allen Smith is requesting authorization from the Board to surplus the following items for removal from their inventory. If approved, the items will either be sold on www.govdeals.com or will be disposed of in another way.

- 1- 2012 Ford F150
- 2- Ferris 22" Mower
- 3- John Deere 72" Mower
- 4- Essick Mixer
- 5- Case 595 Tractor
- 6- (2) Gorman Rupp Sewer Pumps
- 7- Miscellaneous Handheld Tools (pallet)
- 8- Sheepsfoot Tamper

SUGGESTED MOTION(S):

OPTION 1

I make a motion to approve the surplus list as presented.

or

OPTION 2

I make a motion to approve the surplus list with the following change(s):

OPTION 3

I make a motion to deny approval the surplus list for the following reason(s):

Town of Carthage
Board of Commissioners



MEMORANDUM

Date: December 18, 2023
To: The Board of Commissioners
From: Kim Gibson, Town Clerk
Subject: Set Date for Vacant Planning Board Seat Interviews

SUMMARY OF REQUEST:

At the last meeting, the Board asked for Volunteer Applications for the newly opened seat on the Planning Board. Administrative staff have received three applications as of the January 8th deadline. Staff asks the Board to decide whether they wish to extend the application period for a larger pool of applicants or if they are satisfied that the deadline was met and wish to set an interview date for the applicants that have applied.

SUGGESTED MOTION(S):

OPTION 1

I make a motion to set an interview date/time/location of _____
_____ for the vacant Planning Board seat.

OPTION 2

I make a motion to extend the application period until _____.



Town of Carthage

APPLICATION FOR APPOINTMENT TO COMMITTEES AND BOARDS

I, the undersigned am interested in community service and provide this information for use by the Carthage Town Board in considering my qualifications for appointment to the Carthage Committee or Board in which I am interested.

PERSONAL INFORMATION

Committee or Board in which you are interested Planning Commission Board Member	Date of Application 12/31/23
Name Ian Lumgair	Phone Number (757)272-3378
Email Address lumgairformayor@gmail.com	Preferred Method of Contact <input checked="" type="checkbox"/> Phone Call <input checked="" type="checkbox"/> Text Message <input type="checkbox"/> Email
Mailing Address, City, State, Zip 604 S McNeill St Carthage NC 28327	Length of Time as a Resident Moore County <u>8 yrs</u> Carthage <u>8yrs</u>

EDUCATION

Current or Most Recent Job Title Retired Military	Current or Most Recent Employer US Army
Civic and Professional Activities Ran for Mayor, VFW life member	
Past Membership in Organization and Offices Held VFW Service Officer, US Army Victims Advocate, Carthage Business Owners Association,	
Additional special talents, experience, education, or training that you feel qualifies you for service: See Attachment	

Signature of Applicant

12/31/23

Date

Please return application to: Town of Carthage
Attn: Town Clerk
4396 US 15-501 Hwy
Carthage, NC 28327
OR Email: townclerk@townofcarthage.org

22 Years Active Military: Associate degrees in Auto Restoration, Auto Service Tech, Auto Collision Tech, Motorcycle Tech, Aircraft Tech: Master Tech AH-64 Apache: Military Education Intelligence Analyst Master Course, Advanced Source Operations Course, Advanced HUMIT Analyst Course, Counterintelligence Special Agent Course, Red Team Members and Leaders Courses: Pursuing Degrees in History,.



Town of Carthage

APPLICATION FOR APPOINTMENT TO COMMITTEES AND BOARDS

I, the undersigned am interested in community service and provide this information for use by the Carthage Town Board in considering my qualifications for appointment to the Carthage Committee or Board in which I am interested.

PERSONAL INFORMATION

Committee or Board in which you are interested Planning Board	Date of Application Jan 6, 2024
Name Lauren Kenefick	Phone Number
Email Address clankenefick91@hotmail.com	Preferred Method of Contact <input type="checkbox"/> Phone Call <input checked="" type="checkbox"/> Text Message <input type="checkbox"/> Email
Mailing Address, City, State, Zip Carthage	Length of Time as a Resident Moore County <u>20yrs</u> Carthage <u>17 yrs</u>

EDUCATION

Current or Most Recent Job Title Supv US Dept of Commerce	Current or Most Recent Employer Board of Elections
Civic and Professional Activities	
Past Membership in Organization and Offices Held Appearance committee	
Additional special talents, experience, education, or training that you feel qualifies you for service: Military Spouse (Ret.), College level education, patience and	

Signature of Applicant

1/6/24
Date

Please return application to: **Town of Carthage**
 Attn: Town Clerk
 4396 US 15-501 Hwy
 Carthage, NC 28327
 OR Email: townclerk@townofcarthage.org



Town of Carthage

APPLICATION FOR APPOINTMENT TO COMMITTEES AND BOARDS

I, the undersigned am interested in community service and provide this information for use by the Carthage Town Board in considering my qualifications for appointment to the Carthage Committee or Board in which I am interested.

PERSONAL INFORMATION

Committee or Board in which you are interested TOC Planning Board	Date of Application 12-28-2023
Name Malcolm Hall	Phone Number 910-585-3199
Email Address playingbytherules101@gmail.com	Preferred Method of Contact <input checked="" type="checkbox"/> Phone Call <input checked="" type="checkbox"/> Text Message <input checked="" type="checkbox"/> Email
Mailing Address, City, State, Zip 517 S McNeill St., Carthage, NC 28237	Length of Time as a Resident Moore County <u>20 Years</u> Carthage <u>20 Years</u>

EDUCATION

Current or Most Recent Job Title Retired	Current or Most Recent Employer Self
Civic and Professional Activities TOC Appearance Committee, MLB & Minor League Baseball, Minor League Football Owner, and Union Leader	
Past Membership in Organization and Offices Held AFSCME Local 2149, Vice President/Chief Steward, MLB, Team leader/scheduler in the OR at Firsthealth Moore Regional Hospital, and Highway Maintenance Foreman for PA DOT	
Additional special talents, experience, education, or training that you feel qualifies you for service: Nonpartisan in decision making, approachable, and available. Willing to research before making quick, hasty decisions and not afraid to question. Always looking for sustainability and how it will fit within the surrounding area. I will follow the UDO and Land Use Plans that are available at the time decisions are rendered.	

Signature of Applicant

12-28-2023
Date

Please return application to: **Town of Carthage**
Attn: Town Clerk
4396 US 15-501 Hwy
Carthage, NC 28327

Town of Carthage
Board of Commissioners



MEMORANDUM

Date: January 12, 2024
To: The Board of Commissioners
From: Emily Yopp, Town Manager
Subject: CONSIDERATION OF MINIMUM HOUSING CODE VIOLATION ORDINANCE; 202 W. BARRETT ST.

SUMMARY OF REQUEST:

The Town of Carthage Code Enforcement Officer(s) have had on-going issues with the property located at 202 W. Barrett St. being in violation of the Town's Minimum Housing and G.S. § 160D-1203. Code Enforcement asks that the Board consider the proposed Ordinance, ORD.24.01 to allow the process of enforcing said Minimum Housing violations.

SUGGESTED MOTION(S):

OPTION 1

I make a motion to approve Ordinance ORD.24.01 as written and presented, allowing Code Enforcement to proceed to effectuate the purpose of the Carthage Minimum Housing Code and G.S. § 160D-1203.

or

OPTION 2

I make a motion to approve Ordinance ORD.24.01, allowing Code Enforcement to proceed to effectuate the purpose of the Carthage Minimum Housing Code and G.S. § 160D-1203 **with the following change(s)**:

or

OPTION 3

I make a motion to **deny approval** of Ordinance ORD.24.01 as, allowing Code Enforcement to proceed to effectuate the purpose of the Carthage Minimum Housing Code and G.S. § 160D-1203 **for the following reason(s)**:

Return to:
Town of Carthage
4396 Hwy 15-501
Carthage, NC 28327

Owner(s): Paul Darke Cornwell and Charles Vernon Watson II (life estate)
PIN: 8578 1951 6866

AN ORDINANCE ORDERING THE TOWN OF CARTHAGE CODE ENFORCEMENT OFFICER TO PROCEED TO EFFECTUATE THE PURPOSE OF THE CARTHAGE MINIMUM HOUSING CODE AND G.S. § 160D-1203

WHEREAS, Paul Darke Cornwell and Charles Vernon Watson II (the “Owners”) are the Owners of the property identified in the Moore County Tax Records as PID 00006864 and PIN 8578 1951 6866 and having a street address of 202 W. Barrett St. Carthage, NC 28327 (the “Property”) and as defined in a deed recorded in the Moore County Registry at Deed Book 5873, page 391; and

WHEREAS, the Town of Carthage Board of Commissioners previously adopted an Ordinance on January 22, 2019, ordering the Town of Carthage Code Enforcement Officer to cause the dwelling (the “Dwelling”) located on the Property to be repaired, vacated and closed, or removed or demolished. Said Ordinance is recorded in the Moore County Registry at Deed Book 5082, Page 325; and

WHEREAS, since that time the Dwelling on the Property has continued to deteriorate; and

WHEREAS, on June 28, 2021, the Town of Carthage Code Enforcement Officer conducted a new inspection of the Dwelling located on the Property; and

WHEREAS, the Town of Carthage Code Enforcement Officer found that the Dwelling was unfit for human habitation; and

WHEREAS, on August 6, 2021, the Town of Carthage Code Enforcement Officer served upon the Owner and parties of interest in the Dwelling a complaint stating the charges in that respect and containing a notice of a hearing to be held before the Officer; and

WHEREAS, a duly noticed hearing was held on August 20, 2021, before the Code Enforcement Officer at the Carthage Town Hall; and

WHEREAS, the Code Enforcement Officer issued an Order (the “Order”) on August 20, 2021. In the Order, the Officer determined that the Dwelling was deteriorated/dilapidated and ordered the following steps be taken: **Repair the Dwelling within 30 days and/or vacate and close the Dwelling within 30 days;**

WHEREAS, the Code Enforcement Officer has conducted numerous inspections since August 20, 2021, from the street right-of-way in an effort to monitor the Dwelling’s progress of improvement or continued deterioration;

WHEREAS, the Owners have failed to timely comply with the Order;

NOW, THEREFORE, BE IT ORDAINED by the Board of Commissioners of the Town of Carthage, North Carolina that:

1. By virtue of the authority granted by Carthage Code of Ordinances § 93.56, *et. seq.*, “Housing and Building Code,” and by G.S. § 160D-1203, the Town of Carthage Code Enforcement Officer is hereby ordered to cause the aforementioned Dwelling to be repaired or removed or demolished, or, as appropriate and in the sound judgment of the Code Enforcement Officer, to vacate and close the Dwelling to prohibit and/or limit access, as provided in the original Order of the Officer;

2. The Town of Carthage Code Enforcement Officer shall place a placard on the Dwelling with the following words: “This building is unfit for human habitation, the use or occupation of this building for human habitation is prohibited and unlawful”;

3. This ordinance shall be recorded in the Moore County Registry; and

4. As provided by Carthage Code of Ordinances § 93.74 and by G.S. § 160D-1203(7), the cost of any repair, vacating, closing and/or demolition of the Dwelling caused to be made by the Officer shall be a lien against the real property upon which such cost was incurred and upon any other real property of the Owner located within the Town limits, except for the Owner’s primary residence.

5. Summary Ejectment. The Carthage Code Enforcement Officer and the Carthage Town Attorney are hereby authorized and directed pursuant to Carthage Code of Ordinances § 93.71 and G.S. § 160D-1203(8) to order in the nature of summary ejectment on behalf of the Town against either Owner if he refuses or fails to vacate the Dwelling, as provided in the original Order of the Officer.

The foregoing ordinance, having been submitted to a vote, received the following vote and was duly adopted this ____ day of January, 2024.

Ayes: _____

Noes: _____

Absent or Excused: _____

Dated: _____

Jimmy Chalflinch, Mayor

Attest:

Kimberly Gibson, Town Clerk