MEETING NOTES FROM THE INDOOR AIR QUALITY PANEL

INDIANA STATE DEPARTMENT OF HEALTH

MAY 6, 2011

The meeting began at 9:00 a.m. with the reading and approval of the meeting agenda.

The agenda included the following items:

1. Approval of the meeting agenda
2. Introduction of the panel members and guests
3. Reading of Final Rule LSA Document #09-682(F); effective May 13, 2011
4. Discussion of Best Practices Manual
    A. IAQ Coordinator/Committee
    B. Idling Vehicles
    C. HVAC Maintenance
    D. Live Animals
    E. Housekeeping
    F. Pesticides
    G. Furniture and Appliances
    H. Chemicals
    I. Swimming Pools
5. Recommendations for Best Practices Manual
    A. Approval of Changes
    B. Additional Chapters Needed
6. Schedule for fall meeting – November TBD
7. Adjourn

Attendees were:

Panel Members: Jennifer House, Gary Green, Mary Tanis, Phil Gillespie, Theresa Distelrath

Guests: Art Henderlong, Ron Clark

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Read the Final Rule LSA Document #09-682 (F)

Began Discussion of Best Practices Manual: comments below

IAQ COORDINATOR/COMMITTEE

- Began our meeting with a discussion about EPAs "Tools for Schools (TFS)" program.
- IDOE and SMACNA representatives discussed the IAQ guidelines for occupied buildings. Phil Gillespie can provide manual for IAQ surveys.
- Having an IAQ coordinator and committee is a valuable resource for any school. These individuals can eliminate IAQ problems and their sources before any complaints have been made to the school or state.
- An Indoor Air Quality Coordinator can be appointed at the school or corporate level. Larger corporations that have both IAQ coordinator and a committee would be an advantage.
- Schools wishing to start an IAQ committee should review the EPA's TFS program. The TFS program will provide guidance in establishing a new program or expanding on an existing program. The Director of Education (DOE) could be the point person (trainer) for beginning this type of program. When beginning this type of program, be aware of the location of intake valves for idling issues.
- Idling vehicles on school property has been associated with a wide range of health issues including; triggering asthma attacks, carbon monoxide poisoning, eye and respiratory irritation, contributing to ozone generation and air pollution.
- The Indiana IAQ Rule 410 IAC 33-4-3 requires schools to adopt and enforce a policy limiting vehicle idling on school campuses. The Indiana Department of Environmental Management has signs that provide recommendation for idling locations/zones. Panel member should review this signage and request reference of it from IDEM if appropriate.

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EXAMPLES OF GOOD IAQ RESOURCES AND REFERENCES

http://www.health.state.pa.us/pdf/hpa/epi/revised_indoorair.pdf
http://www.ctcase.org/summaries/iaq_sum.html
http://www.miaqc.org/School%20IAQ%20Resources.htm
http://www.cdc.gov/niosh/docs/2004-101/chklists/6indoo~1.htm
http://www.odh.ohio.gov/rules/final/f3701-54.aspx
http://www.odh.ohio.gov/odhPrograms/eh/schooleh/tmpage.aspx

IDLING VEHICLES

Example Policy:

School Corporations are free to use and modify this policy to meet their needs.

******* School Corporation Policy to Limit Vehicle Idling **********************

A: Purpose – This policy is to limit vehicle emissions that might be brought into school buildings as mandated by 410 IAC 33-4-3. This will improve the health of students and staff through reduced exposure to these emissions.

B: Applicability – This policy applies to all public and private vehicles on the school campus.

C: Idling

1. **Posting**
   - **a)** The school shall post signs in areas where idling is prohibited. It was suggested that the IDEM 5 Star program may have a good template sign that we could request the use of.
2. **Requirements**
   - **a)** Drivers of vehicles are to turn off the engine if the vehicle is to be stopped more than 5 minutes. (Engine cool down periods recommended by vehicle manufacturer may be followed)
   - **b)** The employer of the bus driver shall inform the bus driver of these requirements.

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c) Teachers and school staff shall be informed of this policy at the start of each school year.
d) During student / parent orientations, parents, and students over the age of 16, shall be informed of this policy.
e) Any complaints of non-compliance are to be filed with the Superintendent's office.
f) Any complaints of non-compliance will be reviewed and action taken as necessary.

D: Exemptions

1. **Safety of Children or Emergencies**
   a) Use of lift equipment during loading or unloading of individuals with special needs.
   b) Use of heater or air conditioning during loading or unloading of individuals with special needs.
   c) Use of defrosters, heaters, air conditioners, or any other equipment for health or safety concerns.
   d) Use of bus headlights or flasher warning lights for safety or visibility purposes.
   e) For other safety or emergency issues.
2. **Hot or Cold Weather**
   a) If bus drivers are at a location more than 15 minutes, a waiting area should be provided for their use after turning off the bus engine.
   b) From (beginning date) to (ending date) if necessary and the bus has air conditioning, the bus may idle for a minimal period to cool the bus prior to loading, or while students remain on the bus.
   c) If necessary due to cold temperatures, a vehicle may idle for a minimal time to warm the vehicle.
3. **Maintenance Operations**
   a) (When possible, maintenance operations should not be conducted within 100 feet of a school building housing classrooms.) Buses may idle as necessary as part of a pre-trip safety inspection.
   b) If necessary to make emergency repairs to vehicles. (for example jump starting another vehicle)

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HVAC MAINTENANCE

- It is suggested that all schools develop a routine maintenance for all HVAC units by creating SOP's and have a maintenance log book for the HVAC systems. One major suggestion is to clean the drip pan, check drain tube, clean the coils, and clean condensation drain/piping. Include a reference for the location and landscaping (SMACNA?) on how to construct duct work. The minimum grade for filters is $\geq$ 35% efficiency rating. Phil Gillespie can provide grade number and reference. It is a good idea to inspect and be aware of the integrity of the duct system. All commercial systems must be sealed when doing new construction and doing remodeling. Older systems have been found to have leaks for 30-40%. The environmental design should be greater than bush height.
- When doing preventative maintenance schedules, some things to consider is as follows:
- HVAC systems:
    1. Filters replaced/fitted properly = every three months or as needed
    2. Fan/air flow direction = every three months
    3. Belt tension = annually
    4. Drain pans empty/clean = every three months (check condensation drain)
    5. Overall cleanliness of ducts and unit = annually
    6. 15-20% of air delivered is fresh = every two years
    7. Calibration of System = every two years
    8. Thermostats functional = every three months
- Cleaning Schedule:
    1. Cleaning of Heating coils = annually
    2. Cleaning of cooling coils = every six months
    3. Cleaning of drainage areas = every six months
    4. Cleaning of ductwork = as needed
- Air Intake:

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1. No obstruction = every three months
2. Air flow into duct = every three months
3. No pollutant sources nearby (garbage, idling vehicles, or exhaust) = every three months
4. Dampers operational = every three months
5. Motors operational = every three months

- Local Exhaust Systems:
    1. Proper exhaust volume = annually
    2. Air direction correct = annually
    3. Fan functional = annually
    4. Outdoor vent checked/cleaned = annually
- Other:
    1. Sewage traps filled with water weekly = every three months
    2. Hazardous chemicals storage = every six months
    3. Walk off mat cleanliness = every three months
    4. Carpet cleanliness = every three months
    5. Check ceiling tiles for leaks, stains, moisture inspection = every three months
    6. Clean all classroom tables, diffusers, shelves = every three months or as needed
    7. Deep clean carpets, strip and wax floors = every six months or as needed
    8. Add reference for exhaust and intake locations with 18 inches without obstruction = as needed

LIVE ANIMALS

- Live animals in schools are not recommended according to EPA, but if a school feels that the animals are useful for educational purposes, there are certain steps that should be followed to minimize student's risk of asthma, allergy attacks, exposure to infectious disease, or trauma. The recommendations are as follows:

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1. Notify parents of the plan to have an animal in the classroom.
2. Keep animals in cages or localized areas as much as possible; do not let them roam freely.
3. Clean cages regularly. Consider using disposable gloves when cleaning cages.
4. Locate animals away from ventilation system vents to avoid circulating allergens throughout the room or building.
5. Locate sensitive students as far away from animals and habitats as possible.
6. Keep animals away from upholstered furniture, carpets, and stuffed toys.

- Indiana code 410 IAC 33-4-7 (d) states: schools allowing animals in the classroom shall have a written policy addressing the following:
    1. What animals are allowed
    2. When animals are allowed in classrooms for education purposes
    3. The duration of the animals' stay in the classroom
    4. Housekeeping requirements
    5. How issues with students or staff allergic to the animal will be addressed

Examples of animals allowed in schools:

Examples of educational purposes where animals would be in the classroom for an extended period are:

1) Animals used in health class to demonstrate affects of different diets.
2) Animals used in biology to show developmental changes or diversity.
3) Eggs incubated to show development.

Examples of educational purposes where animals are in the classroom for one day or less:

1) Pets/animals brought into the classroom to allow students exposure to a variety of species.

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2) Pets/animals used to demonstrate obedience training.

HOUSEKEEPING

- Housekeeping practices can reduce many allergens and asthma triggers in schools. Best practices for housekeeping and maintenance are as follows:
    1. Chemicals
        - Protect yourself and coworkers. Follow all safety instructions
        - Choose the least hazardous chemical that safely performs the task
        - Prepare solutions following manufacturer's instructions, never exceed maximum strength
        - Never blend chemicals unless specifically allowed on the label
        - Use chemical for purpose designed, i.e. never use a floor cleaner on a desk
        - Properly label containers
        - Store chemicals safely, following rules for compatibility, spill guards, temperature, and ventilation
        - Purchase in smaller quantities to avoid storage of large volumes over extended periods
        - Properly dispose of excess material that is outdated, no longer usable, or no longer needed
    2. Trash
        - Empty waste containers (both indoors and outdoors) in a timely manner to avoid attracting insects and rodents
        - Locate away from air-intake valves, doors, and windows and change liners on a routine basis and whenever needed
        - Recycle appropriate cleaned containers
    3. Dusting and sweeping
        - Airborne dust often carries allergens and can be an asthma trigger so use precautions if performing these operations when children are present
        - Micro-fiber cloths are much better at trapping dust particles and reduce the particles release into the air

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- Utilize separate cleaning cloth for each task (color-coded is recommended)

4. Mopping
   - After mopping, dry and ventilate to avoid high humidity situations
   - Any chemicals with warnings of respiratory hazards should not be used when children are present, and the area should be properly ventilated prior to reentry
   - Color-coded cleaning materials to prevent cross contamination are recommended
5. Vacuuming
   - Vacuum should have proper filter system to avoid dust being released into the air
   - Develop a vacuuming schedule that ensures carpets are kept clean
6. Carpet cleaning
   - Spot clean spills as soon as possible to avoid mold growth
   - Dry as quickly as possible, and ventilate to avoid high humidity
   - Air conditioners are not dehumidifiers. The will remove some moisture by not large amounts. Remember colder is not always better
   - Develop a schedule to keep carpets clean. High traffic areas may need more frequent cleaning
   - Storage containers should be appropriate so as not to impede housekeeping and maintenance and fire-code
   - Storage containers, file cabinets, and other furniture should be located three inches away from the wall. Check the TFS for these requirements
   - Add lighting disposal and light cleaning to the SOP's

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CHEMICALS

- Chemical Policy
    1. The primary focus is to protect students and employee health by enabling schools to store products effectively and minimize health effects and the environment
    2. Due to a wide variety of activities that occur in a school building, many different chemicals are used in a variety of ways. Proper management of these chemicals can sometimes be overlooked and lead to unnecessary hazards.
    3. To comply with Indiana law, schools must adopt and enforce a policy that minimizes student and staff exposure to chemicals. A sample policy is as follows:
        - A hazardous chemical inventory of what chemicals are used, by who, where those chemicals are used, where they are stored and what need to be disposed of
        - Establish a chemical purchasing policy that requires protocol for how chemicals are approved for purchase and ensures material safety data sheets (MSDS) are maintained and indicates locations were MSDS are stored. Consider centralizing purchasing and inventory. Efforts are taken to reduce over purchasing and stockpiling. Also, ensures that "forbidden" chemicals are not purchased or used at the school (i.e. mercury, or products that contain mercury).
        - Establish requirements for storage, including ventilation, compatible storage cabinets (i.e. nonmetal cabinets for sorting corrosive chemicals), locking, and labeling
        - A plan and budget for proper disposal of unused, outdated, or hazardous chemicals
        - Plan for spills, explosions, and accidental exposure to hazardous chemicals

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- There is a variety of free resources available to schools to improve chemical management. These resources include:
    - EPA's Chemical Management Resource Guide for School Administrators - http://www.epa.gov/oppt/pubs/chemmgmt/resourceguide.pdf
    - Indiana's GreenSteps for Schools - http://www.in.gov/idem/4123.htm
    - IDEM's Website on School Lab Cleanouts - http://www.in.gov/idem/6493.htm
    - EPA, Healthy School Environments - http://www.epa.gov/schools/
    - EPA's Schools Chemical Cleanout Campaign (SC3) - http://www.epa.gov/sc3/
    - School Chemistry Laboratory Safety Guide - Consumer Product Safety Commission, www.cpsc.gov,
    - Material Safety Data Sheets - www.siri.org/
    - Chemical Management in Schools (Michigan DEQ) contains sample checklists, chemicals spreadsheets, lists, etc.- http://www.michigan.gov/documents/deq/deq-oppca-notebook-chemicalmanagement_293287_7.pdf
    - Massachusetts School Chemical Management Program - http://www.mass.gov/dep/service/schlchem.pdf
    - Council of State Science Supervisors - Making the Connection Science Safety: It's Elementary -www.csss-science.org/safety.htm
    - Rehab the Lab, Safe labs that don't pollute - www.govlink.org/hazwaste/schoolyouth/rehab/
    - EPA's Mercury Web Site -www.epa.gov/mercury
    - Mercury in Schools Project - www.mercuryinschools.uwex.edu/

- IAC-33-4-8 states:

  Sec.8. (a) **Student exposure to chemicals must be kept to a minimum. When evaluating student exposures, the more stringent of National Institute for Occupational Safety and Health (NIOSH) limits or Occupational Safety & Health Administration (OSHA) limits must be used.**

  b. Where chemicals are used during class, such as, but not limited to, chemistry, biology, and shop classes, appropriate ventilation must be used to minimize students' exposure to these chemicals such as local exhaust system

  c. The school shall adopt and enforce a policy that minimizes student and staff to exposure to chemicals

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- The following list covers several of the types of chemicals students may be exposed to in schools. This list is not all inclusive but will provide the school corporations a starting point when developing their policy.
    1. Chemicals used in the classroom such as white board markers and cleaners
    2. Bactericides
    3. Disinfectants
    4. Germicides
    5. Sanitizing agents
    6. Swimming pool chemicals
    7. Pesticides – see "Pesticide Use at Schools" 357 ISC 1-16

- Suggested Chemical Management Policy
    1. The purpose of this policy is to reduce student staff exposure to chemical hazards from hazardous chemicals used or kept as the school. By selecting products with lesser hazards, and by properly using these products, there will be a reduced risk of exposure to these products.
    2. This policy applies to all chemicals purchased for use in child occupied school buildings
    3. Each year, the school corporation conducts a site-wide chemical inventory. During the inventory, expired and unwanted chemicals are identified for proper disposal. Compliance with this policy is reviewed.
    4. Chemical purchases shall adhere to the following protocol:
        - This school has identified the following procedures and guidelines for purchasing chemicals in a effort to minimize student and staff exposure to chemical hazards:
            a) Please describe how staff may purchase chemicals (i.e. is there a central person who approves purchases or does each department make the decision, etc)

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- First in first out policy is followed. (over purchasing and stock piling are not recommended)
- The least toxic chemical that is still effective for the job is selected. (Material Safety Data Sheets are reviewed to make the determination). This includes selection of cleaning supplies as well as teaching tools for classrooms. Micro and green chemistry are encouraged.
- This school will not purchase chemicals listed on the Banned Chemical List. (School – Please determine which chemicals you will not use. i.e. mercury or mercury containing products; consider lists of chemicals that may be too hazardous)

5. Material Safety Data Sheets (MSDS will be available at _____ (school – determine where these will be kept; consider two locations; a central location and with the chemical) the MSDS books are updated annually and as new chemicals are purchased.
6. Chemical Use
    - Chemicals will be mixed and used according to manufacturer's directions. Measuring devices or direct mixing systems are to be used. Any warnings, especially requirement for ventilation are to be followed.
    - When possible, use of cleaning products should be performed when students are not present
    - Areas where chemicals are being used will be properly ventilated
    - Only properly trained staff may use hazardous chemicals. Staff will receive annual training and when required, certification (i.e. pesticide applicators)
    - Required notification procedures will be followed (i.e. pesticide notifications)
7. Storage
    - Secondary container will not be used to store chemicals unless they are properly labeled and approved for such use

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- Storage areas will be properly ventilated
- Storage areas will be compatible with the chemicals being stored in them
- Reactive chemicals will not be stored near each other
- Hazardous chemicals will be stored in locked areas at all times
- All original container will be labeled with the date received

8. Disposal
    - Unwanted, unused, and outdated chemicals should be identified as soon as possible and not less than annually. They should be marked for disposal
    - Disposal will follow state regulations. Pouring down the drain or throwing in the trash is not acceptable or proper disposal in most instances
    - The school has a budget for proper disposal of hazardous waste
9. Spills, explosions, and accidents (including inhalations, ingestion or direct contact)
    - School – outline steps staff should take in the event of one of these emergencies and include contact numbers 1) call 911 2) call Indiana Poison Center at 1.800.222.1222
    - If staff, teachers, parents, and students donate chemical products, these must be routed through an appointed chemical manager or administration

FURNITURE AND APPLIANCES

- The Indiana State Department of Health's "Sanitary Schoolhouse Rule" 410 IAX 6-5.1-5(N) states: All furniture and equipment used in any school building or a part of a building used for school purposes shall be durable and easily cleanable….In addition 410 IAC 33-4-9 states: furniture in

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classrooms shall be maintained so as to prevent the accumulation and/or growth of allergens.

- Fabric covered, upholstered, sofas and chairs are not easily maintained and can be s source of asthma triggers. Based on the Sanitary Schoolhouse rule cited above, upholstered sofas and chairs are not appropriate for student use.
- Fabric or carpeted walls (stationary or portable) easily trap allergens and are often overlooked during routine cleaning. IAC 33-4010 (b) bans these in new construction (this is to be addressed during remodeling if feasible). Wall coverings can be flammable and you should reference your fire code for directions
- Schools should adopt a policy banning the acceptance of donated used furniture for use in the school. These items could potentially harbor allergens and/or pests that could adversely affect the health of the school's occupants.
- Staff often unknowingly brings appliances into the buildings that can adversely affect air quality. 1) air fresheners can be allergy triggers for some individuals and are prohibited in IAC 33-4-6(b). 2) ozone generator sold as air fresheners are also found in schools. These units emit ozone in an attempt to destroy the odor. Ozone is a known asthma trigger and IAC 33-4-6 (a) states these units shall not be used when the room is occupied.

PESTICIDES

- **Pesticides-**Pesticide application in schools is regulated by the Indiana Pesticide Review Board. To review the rule see: 357 IAC 1-19
    - Schools should use integrated pest management to minimize pesticide use while still controlling pests.
    - EPA's IPM taken from their website is as follows: "Integrated Pest Management (IPM is a safer and usually less costly option for effective pest management in the school community. A school IPM

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program employs commonsense strategies to reduce sources of food, water, and shelter for pests in your school buildings and grounds. IPM program take advantage of all pest management strategies, including judicious careful use of pesticides when necessary)

- To make sure that your school is really using IPM use the following guide:
- The problem or pest is identified before taking action
- Vegetation, shrubs and wood mulch should be kept at least one foot away from structures
- Cracks and crevices in walls, floors, and pavement are either sealed or eliminated
- Lockers and desks are emptied and thoroughly cleaned at least twice yearly
- Food-contaminated dishes, utensils, surfaces are cleaned by the end of each day
- Garbage and dumpsters are cleaned regularly
- Recycling is collected and disposed of properly at least once a week
- Fertilizers should be applied several times (e.g., spring, summer, fall) during the year, rather than one heavy application
- If pesticides are necessary, use spot treatments rather than area-wide applications
- Food in classrooms/lounge stored in air-tight containers
- Use most environmentally safe product that will get the job done.

For more information we suggest you look at the **Midwest Technical Resource Center for IPM in schools and daycares; http://extension.entm.purdue.edu/schoolipm/** or contact them at 1-877/668-8476

SWIMMING POOLS

- According to the Center for Disease Control, irritants in the air at indoor swimming pools are usually the combined chlorine by-products of

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disinfection. These by-products are the result of chlorine binding with sweat, urine, and other waste from swimmers.

- A multi-faceted approach to address this issue is the best way to minimize these contaminants.
    - Insisting swimmers shower prior to entering the pool will reduce the nitrogen products that are instrumental in creating the chloramines. The facility is required to have signage requiring showering as specified in 410 IAC 6-2 Sec. 36 (b) (3)
    - Educate swimmers, teachers, and coaches on the causes of the chloramines, and steps they can take to reduce the chloramines production so the air they breathe will be healthier.
    - Ensuring fresh air supply and exhaust in the pool area meets or exceeds the ASHRAE 62.1 ventilation standard found in ASHRAE 62.1, Table 6-1.
    - Properly maintaining the pool chemistry to minimize the chloramine production in the water is a key step in minimizing airborne chloramines. A low pH in the pool water has been found to contribute to chloramine production in indoor pool facilities.
- Chloramines (combined chlorine) depending on the stage in the chemical reaction are monochloramine, dichloramine and trichloramine. The chloramines, especially the trichloramines, are irritating to the eyes, nose and lungs. Trichloramines cause the "chlorine" smell and hang in the air directly above the pool water level, often causing competitive or frequent swimmers to have asthma like symptoms. High levels of chloramines will also cause corrosion to surfaces and equipment in the pool area.
- Chloramines can usually be eliminated from the pool water by performing breakpoint chlorination with chlorine or super oxidation with a non chlorine oxidizer. Indiana State Department of Health Swimming Pool Rule 410 IAC 6-2.1, Section 30(e) states: "The pool water shall be super chlorinated to breakpoint or super oxidized with a nonchlorine oxidizer, when the pool test kit reveals a combined chlorine (chloramine) concentration of five-tenths (0.5) parts per million (ppm) or greater." 410

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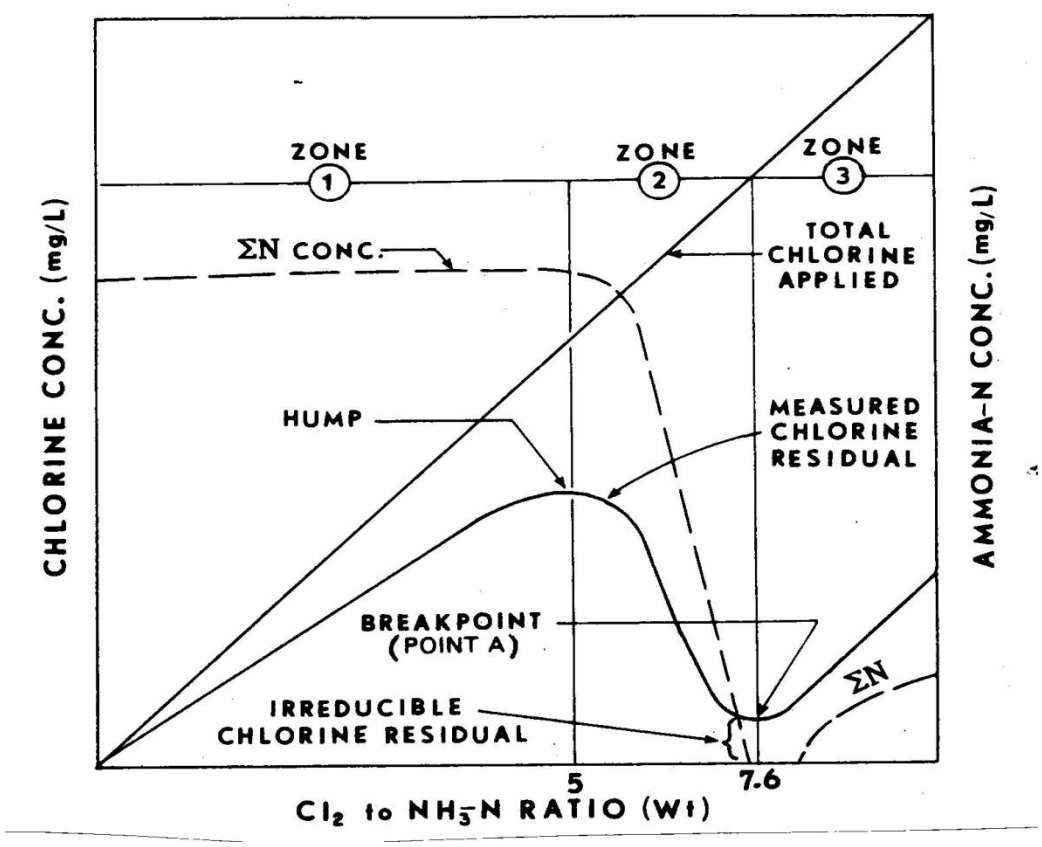
IAC 6-2.1, Sec. 30 (g) states: "The pool shall be closed and remain closed during breakpoint chlorination until the chlorine concentration drops to the maximum level referenced in subsection (b)."

- Breakpoint chlorination is the point at which enough free chlorine is added to break the molecular bonds; specifically the combined chlorine molecules, ammonia or nitrogen compounds. As depicted in the chart below, it takes 7.6 parts of chlorine to break this chemical bond, other contaminants (i.e. bacteria, algae) are also present that must be oxidized, so 10 parts of chlorine must be added. Any excess chlorine leftover will become the chlorine residual (FC).



To reach breakpoint, the following calculation is used:

Example: Calculate the chemical change to achieve Breakpoint Chlorination in 60,000 gallon pool with FC of 1.5 ppm and TC of 2.3 ppm. Using 67% Calcium Hypochlorite where the label states that 2 oz will produce a chemical change of 1ppm in 10,000 gallons of water:

STEP 1: Determine the amount of Combined Chlorine (CC)

Total Chlorine (TC) – Free Chlorine (FC) = Combined Chlorine (CC)

2.3 ppm – 1.5 ppm = **0.8 ppm**

STEP 2: Calculate the breakpoint Chlorination (BPC) amount

Breakpoint (BPC) = CC × 10

0.8 × 10 = 8.0 ppm

STEP 3: Determine the desired change amount

Desired Change = BPC – FC

8.0 ppm – 1.5 ppm = **6.5 ppm**

STEP 3: Determine the amount of chemical to add:

Amount of chemical from product label	Actual Pool Volume	Desired Chemical Change	Total
	60,000	6.5	
	÷ 10,000 from product label	÷ 1.0 ppm from product label	
2 oz.	× 6	× 6.5	78 oz

Convert answer to pounds: 78 ÷ 16 = 4.875 lbs; rounded to 5 pounds.

Steps 1-3 must be done using a DPD test, using the test kit instructions.

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- Sodium hypochlorite (liquid) or lithium hypochlorite may also be used.
- Calcium hypochlorite is most commonly used because of the high available chlorine concentration and it retains its strength in storage.
- This is an "all or nothing" process. Not adding enough chlorine to reach breakpoint will make the problem even worse as the result is the formation of more chloramines and re-dissolving of chloramines back into the pool water. Continual "shocking" but not reaching breakpoint will result in the pool reaching a point of no return. Partial or complete draining of the pool water and refilling with fresh water may be the only remedy at this point. If an indoor pool facility has inadequate air exchange with outdoor fresh air, it will be necessary to add air circulation fans with doors and windows open to keep the air above the pool water level moving to prevent re-dissolving of nitrogen (by product of breakpoint chlorination) leading to more chloramine formation.
- Please note that adding too much chlorine, beyond breakpoint, will yield high chlorine residual that may require the pool to remain closed until the free chlorine residual drops to an acceptable level as required in 410 IAC 6-2.1, Sec. 30(b).
- Additionally, 410 IAC 6-2.1, Sec. 30 (k) states: "Chlorinated isocyanurates and cyanuric acid stabilizers shall not be used in any indoor pool." Stabilized chlorine compounds, such as DICHLOR or TRICHLOR may **not** be used for breakpoint chlorination or continuous chlorination in an indoor pool.

NON-CHLORINE OXIDIZERS

- Non-chlorine oxidizers may be used instead of chlorine breakpoint chlorination, but the pool will still have to be super chlorinated periodically with a chlorine compound to kill off the bacteria that become resistant to constant exposure to low levels of disinfectant (chlorine or bromine). Non-chlorine oxidizer products will oxidize or destroy ammonia, nitrogen and some swimmer waste, but will not kill bacteria or algae.
- Although an advertised advantage to using a non-chlorine oxidizer is the shut down time may be as little as one half-hour; however, 410 IAC 6-2.1-30(s) requires that "The pool shall be closed or a period equal to at least one (1) hour following the manual addition of chemicals."

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- If the manufacturer's label requires closure for more than one hour, then 410 IAC 6-2.1-30(h) states that "… the pool shall be closed and shall remain closed in accordance with the specifications on the product label."
- Potassium monopersulfate is the ingredient used in most non-chlorine oxidizers. As an oxidizer, it reacts with contaminants and prevents combined chlorine from forming (short term). The use of potassium monopersulfate will result in false readings of chlorine for up to 6 hours as it oxidizes the iodide in the reagent as if it were combined chlorine. There is a reagent available to correct this.
- The use of non-chlorine shock chemicals will also interfere with oxidation reduction potential (ORP) readings because it measures the oxidizing potential of the water. These products are an oxidizer causing high ORP readings, but again it is not a disinfectant. In the end, the required free chlorine residual level for disinfection in the pool water may be below the required level as stated in 410 IAC 6-2.1.

Other options:

- Adding a medium pressure UV (ultraviolet) light or ozone system to eliminate chloramines in the pool water. Many large indoor pools used for competition (i.e. colleges and high schools) have had success with using UV. Please note that either system can only be permitted as supplemental disinfection to chlorine disinfection in the State of Indiana.
    - In addition to the disinfection of bacteria and viruses, UV-C will oxidize chloramines. UV-C that is used for chloramine destruction in indoor pools and spas must be polychromatic that produces wavelengths of 200-350 nanometers with a minimum dosage (fluency) of 600 J/m^2 (60 mJ/cm^2). Multiple wavelengths are necessary to destroy chloramines as listed below:
    - Monchloramine 245 nanometers
    - Dichloramine 297 nanometers
    - Trichloramine 260 and 340 nanometers
    - Some municipal water companies are using chloramines for additional disinfection in the distribution system, so there may be significant background levels in the pool supply water. In this case, carbon filters may be an option to reduce the chloramines in the source water.
    - Increasing the amount of fresh water added daily to the pool

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- For the storage of pool chemicals see the guidelines set by OSHA
- For spas, it may be best to drain and refill with fresh water more often. Recommended drain and refill calculation is:
  Spa gallons ÷ 3 ÷ users per day = replacement interval (days)

- The science behind the chloramine production is evolving and as science adds to the knowledge, this document will be changed, as appropriate, to reflect those improvements. For the most up to date information on chloramines in indoor swimming pools see the Environmental Public Health Division's swimming pool web page at www.pools.isdh.in.gov.

The BMP additions and changes were reviewed and approved by all panel members. Agreement was made to discuss with the ISDH Asthma Division to add a chapter specific to asthma. That discussion and addition is pending at this time.

Panel members agreed to meet in Indianapolis at 10am on Friday November 4 for the next business meeting.

The meeting was adjourned at 11:30am.

DRAFT