Papers Presented at the

THIRTEENTH ANNUAL

IN-SERVICE TRAINING COURSE

FOR PUBLIC HEALTH INSPECTORS

In co-operation with
Community Health Standards Division
Ontario Ministry of Health

Course "A"

Selected Technical Aspects of Public Health Inspection
Ryerson Polytechnical Institute, Toronto
April 9 – 12

Course "B"

Management by Objectives and Results
In Public Health Inspection
Cedar Glen Conference Centre, Bolton
April 30 – May 4
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POLYTECHNICAL INSTITUTE

TORONTO , ONTARIO

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A.E. Whiteside, C.P.H.I. (C)
Chairman,
In-Service Training Committee

COURSE "A" - THIRTEENTH ANNUAL IN-SERVICE TRAINING COURSE

Introductory Remarks

Good morning and welcome to course "A" of the 13th annual in service training course for Public Health Inspectors. My name is Ed Whiteside, I am chairman of the Ontario Branch, Canadian Institute of Public Health Inspectors In Service Training Committee. The members of my committee are Mr. Ron de Burger, who is a lecturer at the Public Health Inspectors Training Course at Ryerson Polytechnical Institute, and Mr. Lloyd Dodgson who is a Senior Consultant of Nursing Homes in the Ministry of Health. While this course is sponsored by the Ontario Branch, Canadian Institute of Public Health Inspectors it would not be possible without the co-operation and help of the Community Health Standards Division of the Ontario Ministry of Health. Unfortunately, Mr. John D. Anderson Senior Consultant, could not be with us this morning, and I am afraid this is my fault because I did not contact him early enough. None the less, I would like to convey the Branches' thanks and appreciation to the Ministry for the help we receive from them in putting on these courses.

The idea for this course originated in our own office when some of the men would ask technical or rather practical questions about pieces of equipment on everything from micro wave ovens to package treatment plants. It was this made me realize that perhaps rather than having an academic type of course it might be benificial to have a course developed along the line of field trip training. This has been done and I am sure you will find it educational and interesting. There are, however, some things which make this type of course difficult to conduct and to manage. For instance, in Course "B" the attendants there will go to Cedar Glen Conference Centre and most of them will live in and eat to-gether. This will make it easy to gather them to-gether for each lecture in the morning and the afternoon. In a course such as this one we will be staying at different places and in most instances eating at different places so the responsibility for arriving on time each morning and afternoon is fully on the shoulders of each participant. I mention this because it is reasonable to assume that a small percentage of you could be late on account of sleeping in or just 'doddling' over dinner. It is for this reason that I would ask you to give me your fullest co-operation in being on time, particularly on the days we are being bussed to plant locations. It is quite obvious if you sleep in and are not here at the time the bus leaves then you will be out of luck. We want to cut this kind of thing to an absolute minimum. I would like to see it non existant, but I suppose that is too much to expect. There seems to be another potential pitfall in this type of course and that is that a carefree feeling might become prominent because it is not all being held in a classroom atmosphere. Now I know you are adults and you might resent this but I am asking you to pay mature attention while you are in the plants we will be visiting. In most cases the demonstrators have gone to a lot of effort setting up machines and they will have put a certain amount of preparation into this. Since there has been a larger attendance than I expected the groups will be larger in the plants and it may be a little more difficult for the demonstrators to make themselves heard and understood.

Another drawback to this type of course is the amount of time which is consumed going back and forth from the different locations and also the estimate that has to be placed on the time it will take to explain the operation of a machine and how long it will take to answer questions. For this reason I haven't really packed a lot into it because I would rather be through a little early in the day than try to pack two trips into one afternoon and not leave ourselves time to pick up as much information as is available at each location. This course is not an involved course, it is not a complicated course and there is not a lot of material on the agenda. Some of the things you see and some of the things you hear will not be new to you, but I would ask you to let yourselves be exposed to it with an open mind as no matter how well we feel we know a piece of equipment there is always a new facit that can be explained by an expert. There is always a benefit which can be retained by looking at something anew, with an open mind. Remember too, that there are new ideas, new changes, different points of view and arguments pro and con of which we should be aware. I think the large turn out here for this course indicates a need for basic, grass roots training directly to do with the day to day problems faced by the Public Health Inspector in the field.

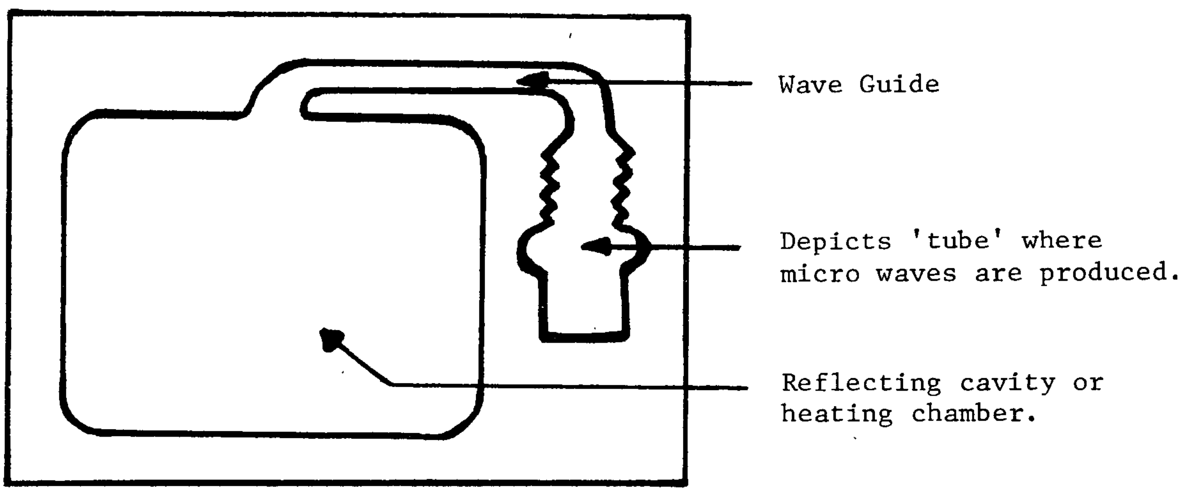
F. Carlino & R. Jones,
Litton Atherton Ltd.

MICRO WAVE OVENS (a resumé of presentation)

Sample of micro wave oven shown and examined by the students was a Menumaster model which incorporated shielded door construction, a combination choke capacitive door seal to limit micro wave emission, dual interlocks, stainless steel cavity with coved corners, sealed in pyroceram shelf and the oven was equipped with a timer which could be pressed to turn the oven off automatically when time had elasped.

Micro Waves - are a non ionizing type of emission with a frequency between that of radio waves and natural light. The particular frequency put out by the oven is 2450 megacycles. The wattage differs according to the model and intended use. Micro waves heat by causing water particles in the product to oscillate extremely, which produces heat. If it was possible to put your hand inside the oven while it was on the heat or burning sensation could be felt.

Smooth surfaces of good conductors form good reflectors for micro waves, as a consequence a wave in such a pipe is reflected back and forth from wall to wall so that it can travel inside the pipe. Hence the power can be transmitted using a "wave guide". In an oven the micro waves are produced electronically in what we will call the "tube" for simplicity and carried along a wave guide which leads it into a reflecting cavity which is the heating chamber. The micro waves then reflect back and forth inside the cavity and causes any product inside the cavity which contains moisture to heat.



The output can be timed, and it will not work if the door is opened. The door is shielded so the micro waves will not come out through the "glass".

The standards established in 1971 by the U.S. Department of Health Education and welfare allow a maximum emission level of .005 watts (or 5 Milliwatts). There are meters available for testing. As far as Public Health Inspectors are concerned it was felt that it is enough to understand the basics of this increasingly common food premises appliance and be able to talk intelligently about it. Operators should be warned to put ovens immediately out of service if defective door latches or door hinges are observed. Any reasonable operator should of course immediately have an oven checked by an expert (usually a serviceman) and any necessary repairs made when latches or hinges are defective. The speakers both said that a report from a Public Health Inspector about an oven which may be leaking could be tactfully followed up by a company representative who would have the equipment to properly check the complaint. Putting tape or paper around an oven door to make it fit tighter is wrong and should be reported to the operator.

A. Skinner,
Moyer Diebel Ltd. &
A. Waghorn,
Economics Laboratory Ltd.

THE SPRAYWAY GLASS WASHER (a resumé of presentation)

A Sprayway Model SW8L glass washing machine was set up for demonstration and questions. This stainless steel machine is 25¼" wide, 39" high and 8' long. They also have a 6' long model SW6. The L or R at the end of the model number means that the conveyor moves from the left to right or from right to left. This machine is found mostly in food premises where large quantities of glasses are used such as root beer outlets, hotels and bars.

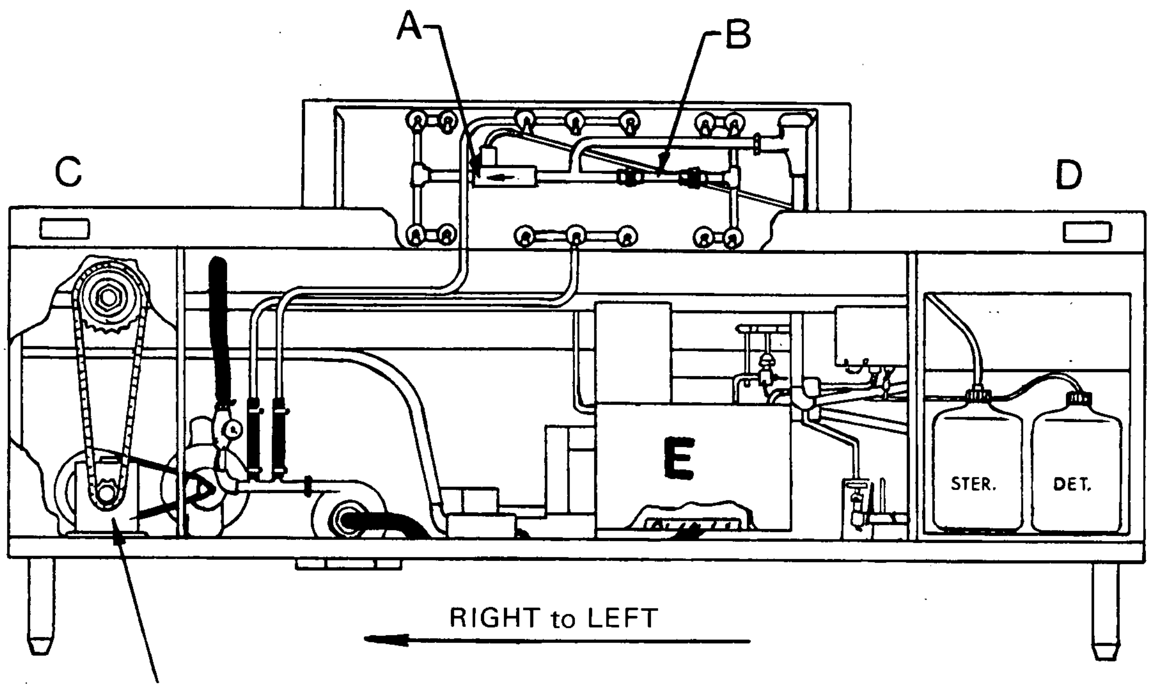
As with most utensil washers it requires a hot and cold water supply, power supply and proper drainage. In operation the glasses are sprayed from above and below. The liquid, first a water spray, then a detergent spray and last the disinfectant spray is forced from hollow tubes as the glasses ride through on the conveyor.

There is a watertank (detergent tank) just to the right of the centre of the machine which contains 7.3 imperial gallons to normal full. This tank is equipped with a float control which puts power to the water heater and also controls the water level in the tank. The water temperature in the tank is controlled between 120°F and 160°F with a heater and thermostat. When this tank is filling, liquid detergent is automatically fed from the detergent supply container (at the right hand side of the machine) into the detergent tank. The wash liquid is pumped from this detergent tank to the wash spray tubes.

The cold and hot water supplies go through an adjustable mixing valve which can give hot or cold water pre wash rinse and disinfectant rinse. The disinfectant is held in a container at the right hand side of machine. An IODAPHOR type disinfectant is recommended by the manufacturer. The iodaphor solution is automatically fed into the line through an injector. It enters the line at the last rinse on the machine.

It is not expected that the public health inspector should know how or be allowed to suggest how to make adjustments to the metering screw which can be adjusted to inject more or less iodaphor solution into the final rinse and disinfectant spray.

It is of no use to do a test for iodine in the detergent tank, as there should not be any in it, however, there is a plug in the end of each spray tube which can be removed and if the plug in the end of one of the disinfectant spray tubes is removed a sample of disinfectant solution may be obtained for testing. This will tell if the correct amount of iodaphor is being injected. A simple colour test is usually adequate if no test papers are not available. The correct amount of iodine will give an amber colour. Of course the Public Health Inspector's true test for all utensil washing machines is the swab test of the utensil after washing.



A – Point where disinfectant is injected to final rinse. (If conveyor moves from left to right this would be at point B)

E – Detergent Tank – The detergent is automatically fed to this tank in controlled amounts from the supply container.

Note – The spray tubes are depicted on the end of the plumbing lines at top centre of machine.

J.H. Sexton &
G. Carter,
Canteen of Canada Ltd.

AUTOMATIC FOOD VENDING (a resumé of presentation)

The Class was welcomed by Mr. John H. Sexton, President of Canteen of Canada, and were shown through the plant by Mr. George Carter, Advertising Manager.

We first examined a bank of vending machines which were opened for viewing and covered some of the items to look for when inspecting food vending machines. (Listed in order in Ontario Regulation-706)

- surfaces which can easily be cleaned.
- built to floor or on casters or on legs at least 6" high.
- sealed service connections to prevent disconnection.
- tight fitting gaskets on product containers.
- openings screened to keep insects out.
- separate compartment for cooler unit.
- product containers and fittings which come apart for cleaning.
- self closing door where cups or food is delivered.
- self drain on machine.
- provided with potable water under pressure.
- check valves and air gap to prevent water back flow.
- thermometer in compartment where perishable foods are kept.
- shut off control to prevent dispensing infection or toxin.
- prone food when the temperature goes above 40°F.

* * *

Food Preparation

Sandwich preparation area was enclosed, air conditioned and a permanent glass partition installed so the process could be observed without possible contamination of the area by the visitors. The construction, maintenance, equipment and food handling techniques appear to be quite good. Assembly line methods were used and proper refrigeration was present. After the sandwiches were wrapped they were put on carts and wheeled into a large refrigerated room which was built right next to the preparation area. They were held in this refrigerated room until truck shipment to the vending locations.

* * *

The men were then allowed to look through the shop where open and dismantled vending machines were located. This allowed a good opportunity to examine such things as service connection openings, product containers and how they dispense, check valves, thermometers and automatic shut offs.

It was a good practical session which helps to recall what is written in the book.

H.E. Slutsky,
Director of Technical Services,
Huntington Laboratories of
Canada Limited

INFECTION CONTROL BY MEANS OF GERMICIDAL AGENTS

In the world about us there is far more life that we do not see than that which is visible. The living organisms in a handful of garden soil far outnumber all the men that live or ever have lived; and yet we have been aware of the existance of these creatures for less than 300 years. Applied microbiology of course is one of the oldest arts. Bread-making, brewing and embalming have been practiced since the dawn of recorded history. Microbiology is thus at one time both a very young and very old science.

Since all of our lives are influenced by micro-organisms we want to know what they are, what they do and how we can control them.

If we start with the largest and most complex micro-organisms, we can set up groups:

1. Protozoa: the smallest animals
2. Algae: the smallest green plants
3. Yeast, Molds and Fungi: the common spoilage organism
4. Bacteria: the largest and most diverse group
5. Richettsia and Viruses: life only in another cell

Protozoa are the wonderful diverse and interesting group of organisms. A drop of pond water under a microscope displays dozens of protozoa swimming about in a variety of ways; because of their size, protozoa were the first micro-organisms to be seen with the naked eye by man through the microscope. While many protozoa are harmless, some of the most serious communicable diseases are caused by others. Some of these are malaria which annually kills 3 million and attacks another 300 million, African sleeping sickness and amebiosis which occurs in our country.

The green colour or scum we see in many ponds, lakes and rivers is due to algae which, like all green plants, have simple requirements. Light, carbon dioxide, nitrogen and phosphorous are all they need to grow and impart a bitter or brackish taste to your drinking water. Fortunately, they are not medically important.

We have all encountered moldy bread, mildew and spoiled fruits and vegetables often enough to be familiar with yeasts, molds, and fungi. These organisms also produce most of the antibiotics and many of the vitamins in use to-day. Diseases caused by them are neither as common place nor generally as fatal as bacterial diseases, but "candidiasis" and Athletes Foot" are real problems in public health.

Most of us refer to bacteria as germs and generally think of them only in terms of causing disease. However, bacteria have a far better record than mankind. Many are harmless or beneficial, and the majority are indispensable to the continuance of life on earth - more than man can claim. Since bacteria are, however, also the most important disease causing organisms, we'll take a somewhat more detailed look at them.

In machine shops, automobiles and wrist watches, size determines to a large extent how much machinery we can put in. In like manner, the size of bacteria determines how much metabolic machinery can fit in. Bacteria are the smallest organisms that can accomodate all the basic staff of life. In fact they are so small that there isn't enough room for all the equipment at any one time, when a bacterium meets a new situation, he fabricates the tools he needs to deal with it. This is what makes him such a formidable antagonist, for often he can forge weapons against the antibiotics and germicides we use. Another factor that weighs in his favour is his ability to multiply by dividing. If under optimum conditions we were to start with one bacterium, when you came in this morning we would only have 64 bacteria by noon. But, by 9:00 P.M. we would have 17 million bacteria.

You can see that in hospitals or food establishments, in this situation, where micro-organisms exist, if they exist under favourable conditions, they can become a definite hazard.

Bacteria are also able to pull on their overcoats (spores) and weather all kinds of storms. New spores are resistant to heat, sunlight, and to drying, which this micro-organism would not be - they are also resistant to many chemical agents. To see all the main groups of micro-organisms you don't have to go any further than your own nose and throat. Now so long as we are healthy, have a normal diet, and don't have any primary illness, the bacteria in our nose and throat are maintained in a balanced population, and the Spirochetes and Streptococcus and other organisms don't have a chance to grow, multiply and really be a source of trouble to us.

Now, there are some bacteria we hear a great deal more about than others - being in the health field you've all heard about staph. Staph was not really an important factor in the hospital until the advent of antibiotics, because prior to this strong disinfectants were used, and antiseptic techniques were used. When the antibiotics came along, if anyone acquired an infection, giving a shot of penicillin or a shot of streptomycin would cure him. That worked all right for the first few weeks or months or even for a few years, but it soon developed there were resistant micro-organisms. Staph aureus was one of the first ones to crop up in wound infections and skin infections and such; it has been, and still is very dangerous. Everyone in the hospital is a staph carrier - everyone who hasn't washed his hands with a germicidal soap is a potential killer.

When a person goes into the hospital and has a puncture for a spinal, in non-sterile instruments are used, pseudomonas can be introduced here and will cause meningitis and many other like diseases. Steptococcus is responsible for septicemias and scarlet fever. When you were a youngster and were vaccinated, vaccine virus scratched into your skin gave you immunity to smallpox. Viruses not only infect people, they also infect plants - if any of you grow tulips or have been to Ottawa during the Tulip Festival, you see very beautiful variegated tulips. These tulips have those unusual colours because they are infected with a virus. Viruses and richettsia are unusual in that they don't carry any of the machinery they need to grow and live. They cannot live outside of the living cell. When they are floating around in the air or carried in a sneeze or where-ever they might be they aren't alive. So we don't talk about killing viruses, because we can't kill something that isn't alive. We talk about inactivating viruses. The common cold with which we are all afflicted at one time or another, is difficult to cure because it is not just one disease - it's many diseases, many virus diseases, and the cold you have in December might be caused by influenza virus, in January by a para influenza virus, in February by adenovirus, so each time you come down with a cold it's somewhat different.

When we talk about micro-organisms we are interested in controlling them. We don't only want to know what they are, but what we can do about them. Let's look at the few principles which are involved here. Basically these principles can be used to classify the different kinds of germicides, the different kinds of disinfectants that we have. One means of killing a micro-organism is by denaturing protein. Denaturing protein is a big two dollar word, but we can get down to terms we are all familiar with - if you broil a steak, or you beat an egg, you are denaturing protein; changing the character of the protein. You can also denature protein chemically, when we use our phenolic germicides we are denaturing protein, when we use some of the halogens (iodophors), we are denaturing protein.

The second principle way in which we can kill bacteria is with something like a quat (quaternary ammonium compounds), by interfering with the structure permeability. The membrane is the important thing in feeding and by using a quat we can break down the passage of food through the skin (membrane). Oxidizing agents, iodine and chlorine, kill micro-organisms by burning them up. When you were just a little fellow, if you cut your finger, you went running in and Mommy poured some hydrogen peroxide on it and it all foamed up -- this was oxidation. This is the way you can kill many micro-organisms.

It's important that when you or I seek a good germicide we realize a few principles. There are many disinfectants which are good. Huntington Labs. has very good disinfectants, and germicides. But I'd like to stress that it is very important to get people to use the right technique, the right amount, and the correct dilution. It's also important to get them to use it frequently enough (there is no money saved as we all know by cutting corners). If a germicide is not used frequently enough, you might as well put water on the floor. Germicides properly used, in proper dilution, proper amount and proper frequency, can be a very important factor in the field that you seek to help. You can prevent a great deal of infections in the areas we discussed.

The film strips shown were: (1) "Germicidal Detergents - The Germ Killers". It is a 35 mm colour film strip with accompanying sound on a cassette and describes types of germicidal detergents and shows how proper use can kill a variety of harmful organisms. (2) "The Importance of Hand Cleaning" a 35 mm colour film strip with accompanying sound on cassette and shows the hospital surgical scrub as the ideal example of thorough hand cleaning and emphasizes the importance of washing hands at the proper time.

These audio and visual aids are available from your Huntington Representative in your area. Write: Huntington Laboratories of Canada Limited - Head Office, 15 Victoria Cres., Bramalea, Ontario. L6T 1E3

Here is an evaluation sheet of "Useful Antimicrobial Chemicals: reference - Prevention and Control of Infection, American Hospital Association 1970.

Figure 12

EVALUATION OF USEFUL ANTIMICROBIAL CHEMICALS

COMPOUNDS (Chemical groups & sub-groups)	USUAL ACTIVITY AGAINST BACTERIA Gram Pos.	Most Gram Negs.	Proteus & Pseudo.	TB	Spores	SPEED OF BACT. KILLING Maximum Strengths	Antiseptic Strengths	INACTIVATION BY PROTEINS OR MUCUS	NOTES on other characteristi
1. **ALCOHOLS**	Good	Good	Good	Fair	None	+ + +	+ + +	* * *	Use on tissues limited to ski Optimal strengths 60 to 80%
2. **PHENOLS, CRESOLS**	Fair	Good	Good	Fair	Poor	+ + +	+ + +	* * * *	Only for necrotic tissues.
a) Synthetics & Chlorophenols	Good	Good	Fair	Fair	Poor	+ + +	+ to + + +	* * *	Weak solutions do not irritat but some sensitize.
b) Chlorguanidine (Chlorhexidine)	Good	Good	Good	Fair	None	+ +	+ +	*	No tissue toxicity or sensitiz ing effects.
3. **FORMALDEHYDE**	Good	Good	Good	Good	Fair	+ + + +	Corrosive	* * * *	Corrosive, irritating to tissues
a) Activated Glutaraldehyde	Good	Good	Good	Good	Good	+ + +	+ +	* *	Some irritation, possible sensitization.
4. **SURFACE ACTIVE AGENTS**									
a) Quaternary Ammoniums	Good	Fair	V.Poor	None	None	+ to + + +	+ to + +	*	Some types with little action on Gram negatives
b) Amphoteric Series Compounds ("Tegos")	Fair	Good	Good	Fair	Poor	+	0	* *	Inactivated by many chemicals

COMPOUNDS	Gram Pos.	Most Gram Negs.	Proteus & Pseudo.	TB	Spores	Maximum Strengths	Antiseptic Strengths	INACTIVATION BY PROTEINS OR MUCUS	NOTES
5. **IODINE**– pure	Good	Good	Good	Good	Poor	+ + + +	+ + + +	* * *	Tissue usage limited to skin & some mucous membranes
a) Iodophores	Good	Good	Good	Fair	None	+ + +	+ + +	* *	No skin "burns"; no staining of fabrics
6. **CHLORINE**– free	Fair	Good	Good	Fair	Fair	+ + +	Corrosive	* * * *	Not usable on or in tissues
a) Chloramines	Fair	Good	Good	Poor	Poor	+ + +	+	* *	Some effect on tissues
7. **METALS**– ionic (Hg, Ag, Sn, Cu)	Fair	Good	Good	None	None	+ +	+ +	* * * *	Use on tissues very limited (protein coagulants)
a) Merthiolate	Good	Good	Good	None	V.Poor	+ +	+ +	* * *	Strongly static, like a Dye
8. **ACRIDINES** –flavines	Good	Good	Fair	None	Poor	+	0	0	Tissue toxicity very low Occasional sensitization
a) with Sulfas	Good	Good	Good	None	Poor	+	+	0	(Same)
9. **SOME COMBINATIONS**									
a) 1 & 5	V. Good	V. Good	Good	Fair	Fair	+ + + +	+ + + +	* * *	Fastest killing of bacteria on skin surfaces
b) 1 & 3	Good	Good	Good	Good	Good	+ + + +	Corrosive	* * *	Corrosive and irritating
c) 1, 2 & 3	V. Good	V. Good	V. Good	Good	Good	+ + + +	Corrosive	* *	Corrosive and irritating
d) 2b & 4	Good	Good	Fair	Poor	None	+ +	+ +	*	Some chemicals like soaps weaken action
e) 4 & 8	Good	Good	Poor	None	None	+	+	*	For skin & wounds but no action on Pseudo.

0 No inactivation
+ minimal
+ + appreciable
+ + + quite marked
+ + + + very extensive

0 static
* slow
* * moderate
* * * rapid
* * * * almost immediate

D.G. Durant, P. Eng.,
D.R. Robertson, P. Eng.,
Wallace & Tiernan Division,
Penwalt of Canada Ltd.

THE PREPARATION AND FEEDING OF CHEMICAL SOLUTIONS

Talk and demonstration given by Mr. David G. Durant, P. Eng., District Manager, and Mr. Duncan R. Robertson, P. Eng., Sales Engineer, Wallace and Tiernan Division, Penwalt of Canada Ltd.

The method of dissolving chemcials, the practical limit of solubility and the per cent of active ingredients vary for each chemical. The following pages give information for preparing and feeding chlorme and alum solutions which can be handled by W & T diaphragm pumps.

CHLORINE (Cl_2)

WATER PURIFICATION

Most untreated or raw water contains dissolved chemicals, such as hydrogen sulfide (H_2S), and living organisms, such as bacteria, that can be destroyed by chlorine. Usually a part of the chlorine that is added to raw water is consumed in a short time on combining with dissolved chemicals and in destroying the living organisms. To make sure that all the harmful impurities are removed from the raw water, sufficient chlorine must be added to leave a slight excess of chlorine in the water. The excess chlorine remaining is known as the CHLORINE RESIDUAL and can be readily measured by means of the ortho-tolidine color test.

The amount of chlorine added, and the amount remaining in the water after treatment is measured in parts per million (ppm). A treatment rate or dosage of 1 ppm means the addition of one pound of chlorine to one million pounds of water which is equivalent to one pound of chlorine to 120,000 gallons of water.

Since different waters absorb different amounts of chlorine, the treatment or dosage rate of chlorine must be varied until a satisfactory chlorine residual is obtained. To insure a disinfected water supply, a chlorine residual must always be present. A chlorine residual of at least 0.3 to 0.5 ppm, measured after the chlorine has been in contact with the water for about ten minutes is generally sufficient to insure disinfection. A residual of this amount may require a chlorine dosage of anywhere from 0.5 to 5.0 ppm. Consult your local or state health authorities for definite recommendations. Frequent checks of the chlorine residual should be made since the amount of chlorine required to disinfect the water being treated (chlorine demand) may vary, or the strength of the chlorine solution being pumped may slowly deteriorate.

Note that the graphs show the amount of hypochlorite to use to provide a dosage rate of 1 ppm. This must be varied as necessary to obtain the desired residual.

Dilute chlorine solutions may be prepared from strong stock solutions of sodium hypochlorite. The most readily available stock solutions for this use are the domestic laundry bleaches. Calcium hypochlorite powder may also be used.

PREPARATION OF HYPOCHLORITE SOLUTIONS

Suitable solution containers for hypochlorite are made from polyethylene and ceramic materials.

When the water used to dilute or mix sterilizing solution for the W & T Diaphragm Pump contains what is commonly termed "hardness", it will be necessary to observe certain precautions. In order to precipitate as much as possible of this "hardness" previous to the solution passing through the Diaphragm Pump, we recommend that soda ash or what is more commonly known as washing soda, be added to the sterilizing solution and all precipitate allowed to settle. The amount of soda ash to be added can be determined experimentally by observing the precipitate. A slight excess is not in any way harmful. Certain types of hardness will precipitate without the washing soda. Obviously the solution which passes through the Diaphragm Pump must be clear so as not to interfere with the action of the valves. In cases of this kind, therefore, a second solution container should be used and the clear solution syphoned over to this second solution container from which the Diaphragm Pump will draw.

Another means of overcoming the effect of hardness is by the use of Calgon* which can be purchased in most drug or grocery stores. This chemical has the property of preventing the precipitation of carbonates if added to the water before the addition of the hypochlorite solution. It is important that the Calgon be in solution in the water before the addition of hypochlorite. The Calgon may be added first to the solution container before water is added or the Calgon may be dissolved separately and then added to the water in the solution container. The solution should be stirred thoroughly to insure uniformity before the hypochlorite is added. The amount of Calgon required for the purpose is small but the exact quantity can be determined by whether or not a precipitate is formed after adding the hypochlorite. It is suggested that one tablespoonful of Calgon be used per 10 gal. and the amount increased or decreased as experience indicates.

1% Solution

To make 10 gallons of a 1% chlorine solution, use one of the following with sufficient water to make 10 gallons.

	Amount
5¼% Sodium hypochlorite+	7 quarts, 18 oz.
10% " "	4 quarts
15% " "	2 quarts, 5¼ oz.
High test calcium hypochlorite powder**	1 pound, 3 oz.

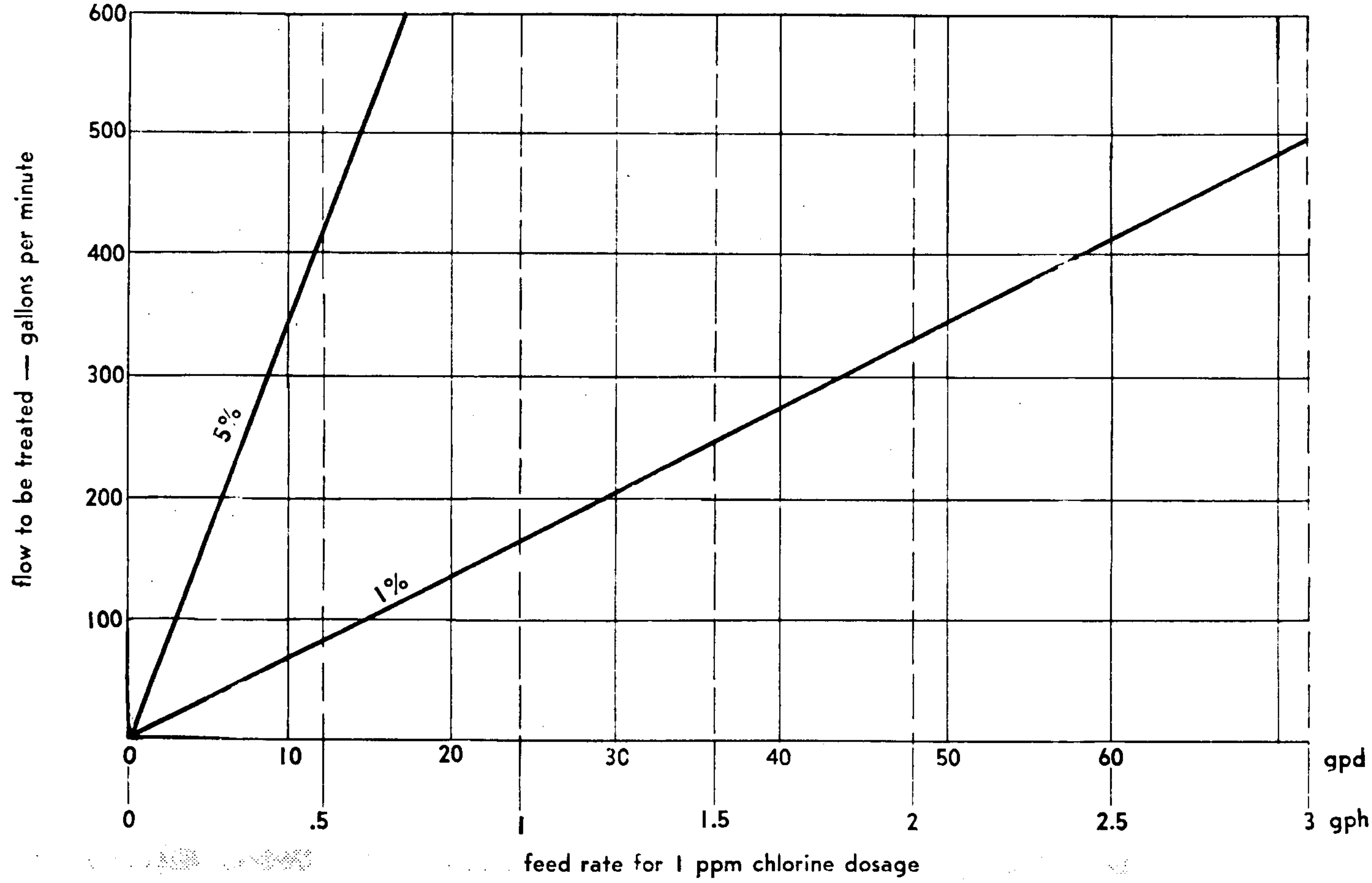
5% Solution

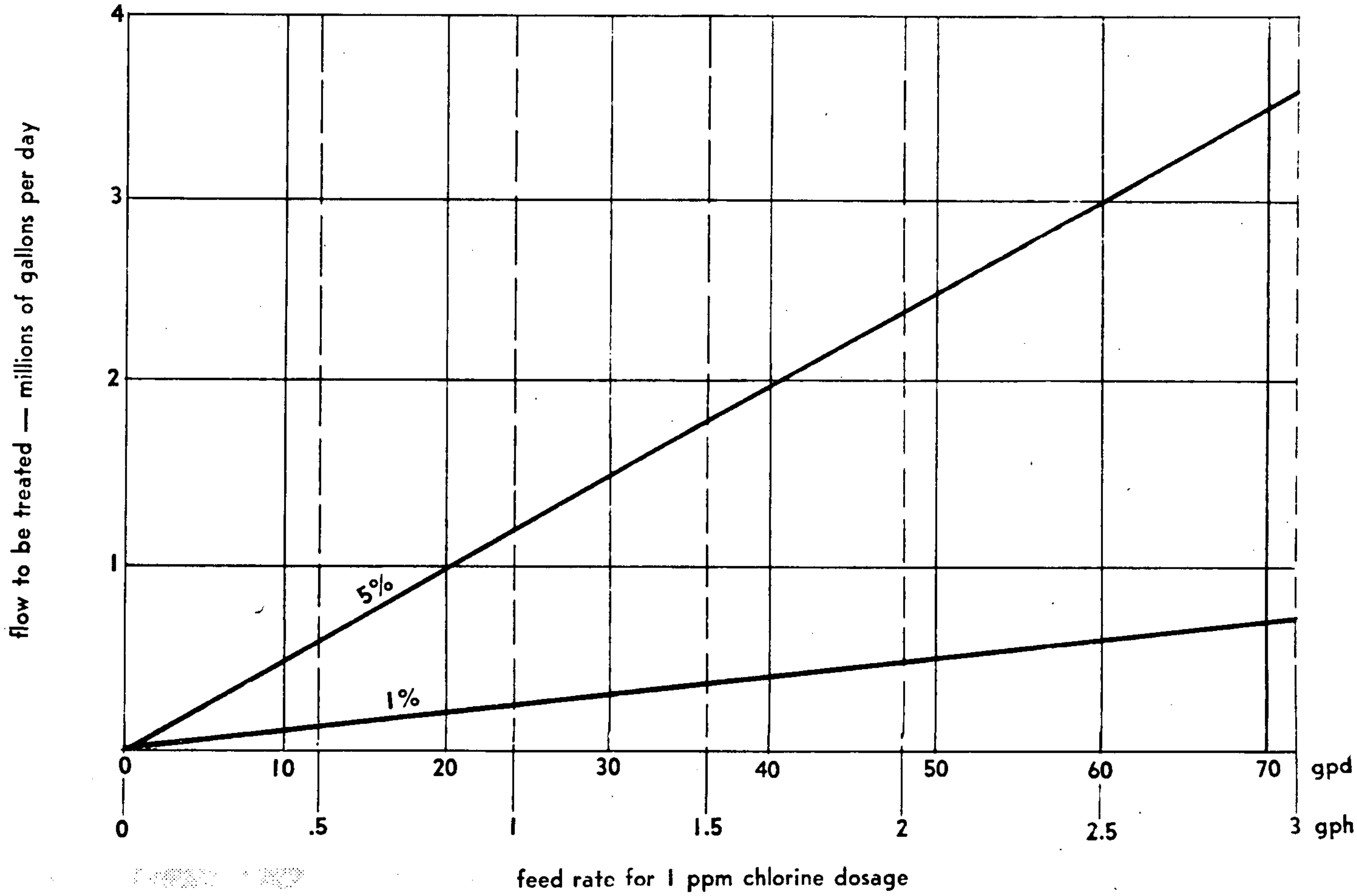
To make 10 gallons of a 5% chlorine solution, use one of the following with sufficient water to make 10 gallons.

	Amount
5¼% Sodium hypochlorite+	9 gal., 2 qt., 6½ oz.
10% " "	5 gal., 7 3/4 oz.
15% " "	3 gal., 1 qt., 14 oz.
High test calcium hypochlorite powder**	6 pounds

To determine the quantity of solution required to treat a given flow of water, refer to the drawings on page 3. Locate on the left-hand scale of the graph the flow of water to be treated. Follow the line to the right until it intersects the diagonal line indicating the strength of solution prepared (line A-1% or line B-5%). Directly below this point of intersection read the gallons per day (GPD-Top Scale) or the gallons per hour (GPH-Lower Scale) required to apply a 1 part per million (1 ppm) dose. Multiply this figure by the number of parts per million required. The result will be the gallons per day (or gallons per hour) of solution required.

*Product of Calgon Corporation, Pittsburg, Pa.
+Most household liquid bleach contains 5¼% sodium hypochlorite.
**70% available chlorine. Stir well, allow sediment to settle and syphon off clear solution for use.


600
500
400
300
200
100
flow to be treated — gallons per minute
5%
1%
0
10
20
30
40
50
60
gpd
0
.5
1
1.5
2
2.5
3 gph
feed rate for 1 ppm chlorine dosage


4
3
2
1
flow to be treated — millions of gallons per day
5%
1%
0
10
20
30
40
50
60
70
gpd
0
.5
1
1.5
2
2.5
3 gph
feed rate for 1 ppm chlorine dosage

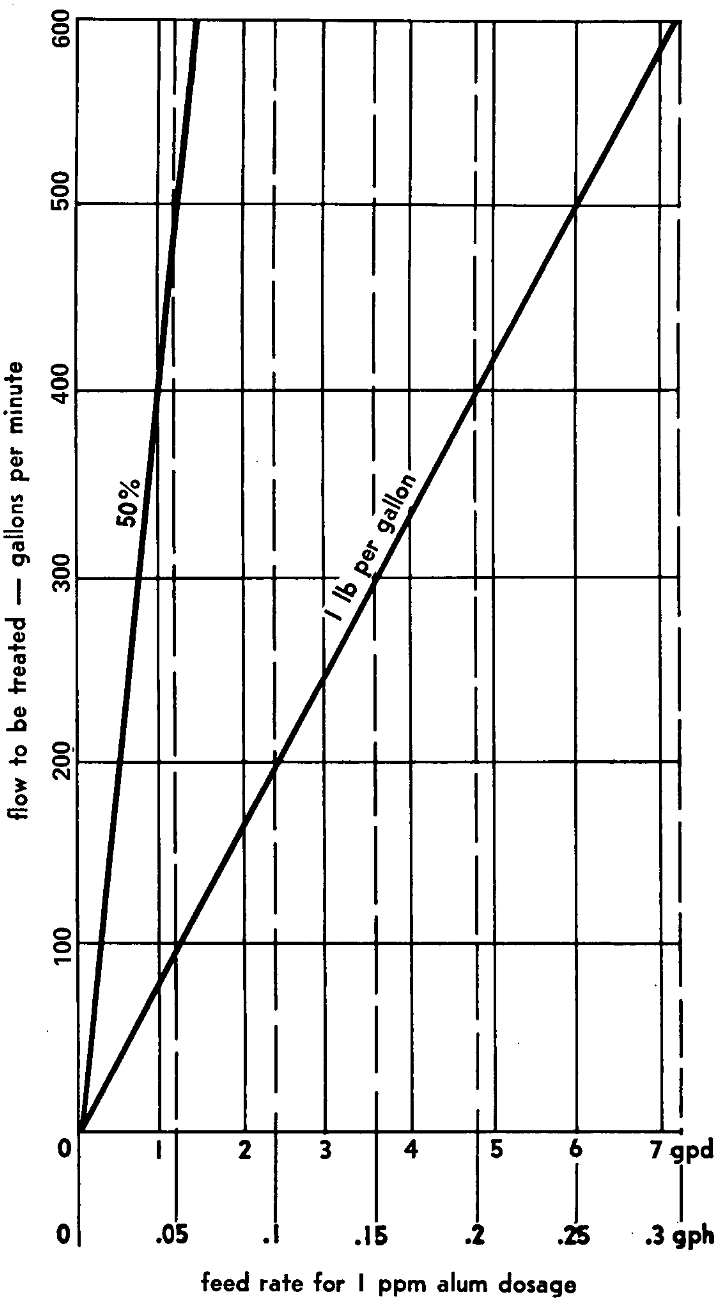
Alum is the most common coagulant used for clarification in water treatment. It is a crystal packaged as a powder, granule or lump. Alum is also available as a 50% solution containing the equivalent of 5.4 pounds of dry alum per gallon. In this form it is usually referred to as liquid alum.

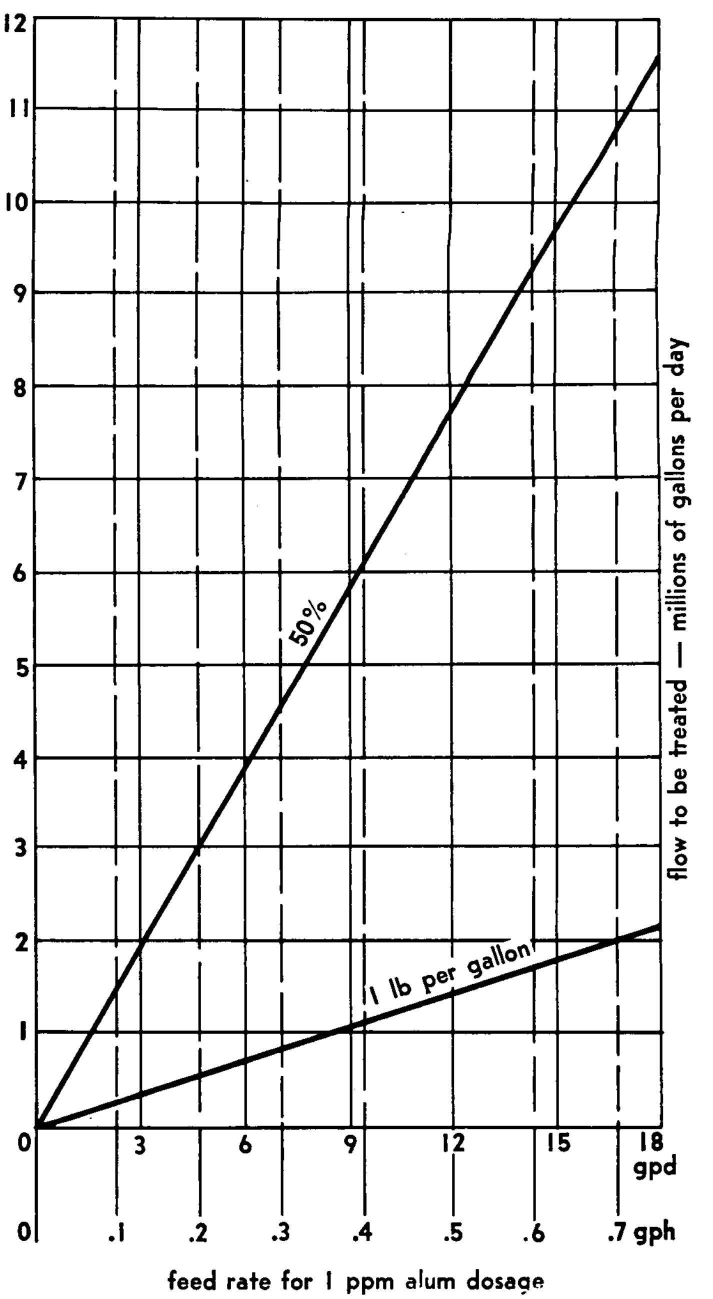
It is difficult to make high concentrations of alum by redissolving the crystals. The highest practical limit is 12-15% by weight.. One pound per gallon is equivalent to 12%. The dissolving of alum crystals is hastened by agitation.

Suitable materials for alum solution containers are stainless steel, lead, rubber, some plastics and ceramic material.

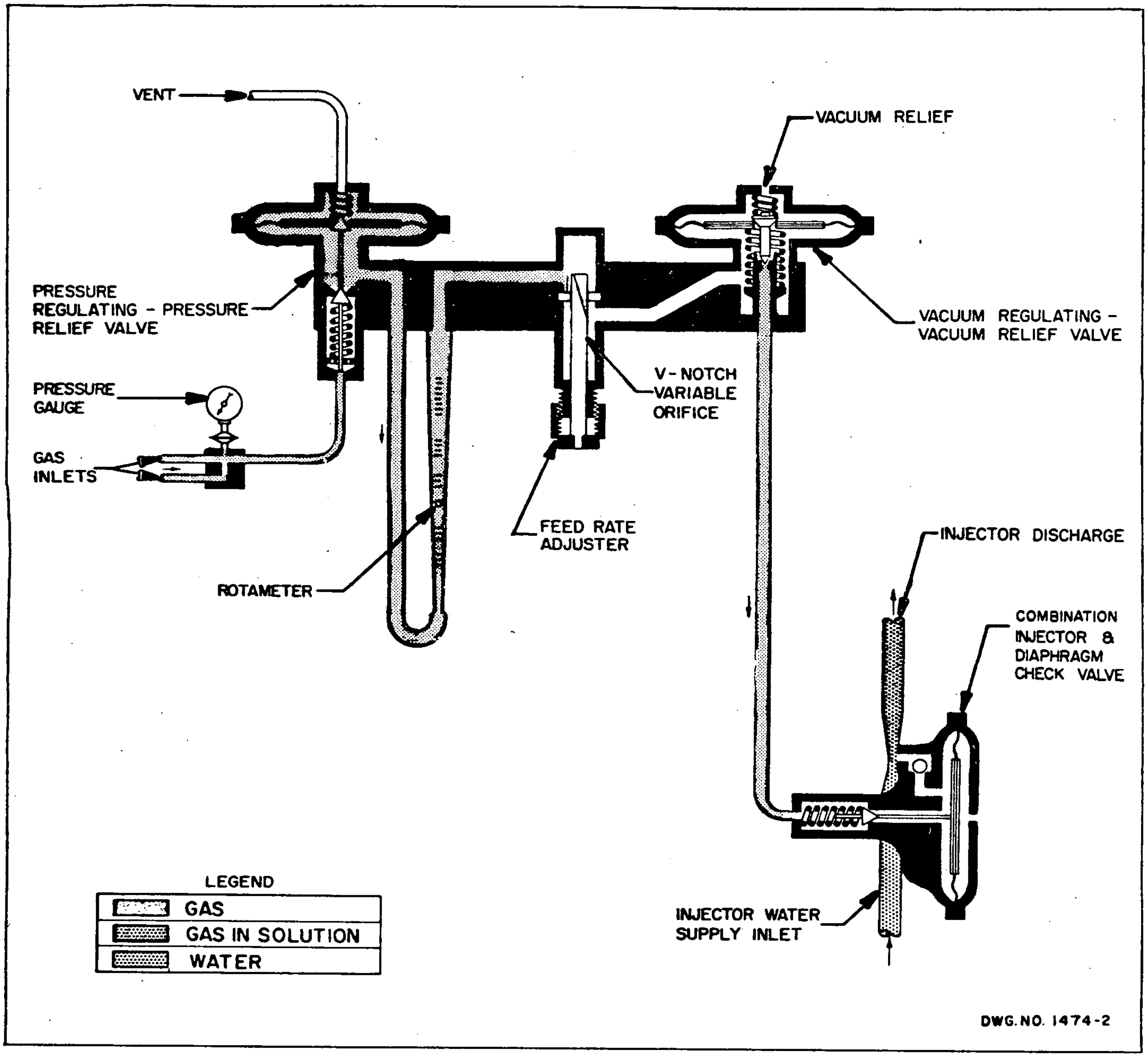
Fifty per cent liquid alum may be applied without dilution. However, since this solution increases in viscosity as the temperature decreases, it is desirable to maintain solution temperature of a least 50°F.

To determine the quantity of solution required to treat a given flow of water, refer to the drawings below. Locate on the left-hand scale of the graph the flow of water to be treated. Follow the line to the right until it intersects the diagonal line indicating the strength of solution prepared. Directly below this point of intersection read the gallons per day (GPD – Top Scale) or the gallons per hour (GPH – Lower Scale) required to apply a *1 part per million* (1 ppm) dose. Multiply this figure by the number of parts per million required. The result will be the gallons per day (or gallons per hour) of solution required.





FLOW DIAGRAM



SHORT DESCRIPTION

The Wallace & Tiernan Series A-741 Chlorinator is a solution-feed, vacuum-operated, wall-mounted type. A series of 13 rotameters provides capacities of 3 to 500 lb of chlorine per 24 hours. Feed range is 20 to 1 for any one rotameter. The V-notch method of control maintains the set feed rate within 4%.

Operating components are mounted on a reinforced plastic panel with corrosion-resistant, vinyl enamel finish. A spring-loaded pressure regulating-pressure relief valve maintains the proper operating vacuum ahead of the V-notch orifice. It opens only under normal operating vacuum and vents to atmosphere if excessive gas pressure develops. Another spring-loaded valve maintains a constant vacuum downstream of the orifice. It also admits air if excess vacuum develops. This air does not pass through the rotameter. The valves are separate valves. They have sealed, diaphragm units with Acme-thread sockets for removal and replacement without tools.

The rotameter has a 10-inch, linear scale. Its graduations and float are in contrasting colors for easy reading. The metering device is a V-notch Variable Orifice. It consists of a plastic plug with a V-shaped groove which moves in a fitted plastic ring. The aspirator-type injector provides the operating vacuum and prevents backflow of water into the chlorinator.

Operation requires no auxiliary water and no drain. A chlorine pressure gauge at the gas inlet is included.

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Ministry of Health,
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MANAGEMENT BY OBJECTIVES AND RESULTS - THE BASIC STEPS

"In May of this year, thirty-five members of the Ontario Branch of the Canadian Institute of Public Health Inspectors attended a residential course on "Management by Objectives in Public Health Inspection" at Cedar Glen Conference Centre, near Bolton, Ontario. The course was conducted by Mr. Brian Quin, Chief of the Development Section in the Personnel Branch of the Ministry of Health, and by Mr. Doug Oxby, Senior Staff Development Officer who is the author of the article that follows."

ARE YOU BUSY?

Are you too busy to read this? Are you so short of time that you cannot afford to stop to consider what makes you so busy? How are you progressing with your plan? Do you have a plan? So many of our day-to-day activities consist of well-intentioned "busyness" that we have little time to ponder where it is all leading. There are so many things to do that we do not have time to worry about whether these things really achieve anything. In short, we are operating on a system of management in which we are managed by the activities and events that hourly impose themselves on us, rather than by taking control and managing our time in the pursuit of purposeful activities. We are "doing" plenty, but do not know what we are achieving. And even if we are achieving something, is this really what we should be achieving? There is not enough time to find out. After all, if "they" are not satisfied with what we are doing, presumably they would let us know. "They" should tell us what they expect us to achieve. Till then, perhaps we should just carry on with what we are doing--they'll tell us soon enough if it is wrong.

Does that type of circular argument sound familiar? Perhaps you need a short course in Management by Objectives and Results. But then, have you the time to study thick textbooks on the subject? And even if you did, is the system so complicated that it takes years to get it going properly? What happens if it fails? Perhaps we should begin at the beginning.

THE CONCEPT

Management by Objectives and Results (MOR) is really quite a simple concept. It becomes complicated only when managers see it as something to be added to what they already do instead of as a total system of management. Unfortunately, many of the textbooks on the subject do little to clarify the system--indeed, through the use of an esoteric jargon in which ordinary, everyday words are given additional and special meanings, the manager finds it difficult to fight his way through the maze of terms that seem to have almost indentical meanings. Thus, we find ourselves struggling with Aims, Goals, Missions, Roles, Statements of Purpose, Statements of Intent, Objectives, Targets, Key Result Areas, Performance Indicators, Evaluation Criteria, Standards, Schedules, Programs, Plans and a host of other terms sometimes used interchangeably and sometimes with very precise definitions and different shades of meaning.

What is the basic concept? Simply stated, Management by Objectives and Results is a total management system for achieving results. Its three main components are:-

1. A statement of intended results - What is it that we intend to achieve?
2. An outline of planned activities for achieving those results - How are we going to achieve them?
3. An assessment of progress and of results achieved and the taking of timely corrective action when we are "off plan" - How will we know how we are doing? How will we know when we have reached our destination?

Let us see if we can set forth the basic steps that are required without the use of any jargon terms.

WHAT BUSINESS ARE WE IN?

The first step is to consider what it is that we intend to achieve. We ask ourselves "What business are we in?" and, more important, "What business should we be in?" In other words, what is the nature of our organization or job and what is its scope: What is our broad purpose? This is usually a simple statement of the long-term direction in which we should be heading. For example, the broad purpose of the Ministry of Health might be stated as "To attain the optimal health of the people of Ontario." This sets the scene, as it were, but is not a very precise indicator of what is entailed. We therefore have to ask some additional questions such as "What does this statement really mean? What is the scope of our business?" Indeed, it may be necessary to define what is meant by "Optimal health" and "people of Ontario" - Are we really in business to eliminate illness or merely to reduce it? Do we have a role in the promotion of good health as well as in the treatment of disease and disability? Should more effort be directed to the prevention of disease, thereby reducing our efforts in treatment and rehabilitation? Or do we have all three roles? Does the expression "people of Ontario" refer only to those who are resident here, or does it include visitors as well? Does it include people who were born in Ontario but who now live elsewhere? How many people are involved? This first step is essentially one of deciding the nature and scope of our work.

WHAT MATTERS MOST?

Assuming that our resources were unlimited--that there were sufficient funds available for us to do everything that seems desirable and that there were sufficient trained manpower for every one of our roles--it would not be necessary to consider relative priorities. Unfortunately, we are never likely to reach that happy stage. It is therefore necessary, as a second step, to ask "What matters most?" In what areas is it essential that we should achieve results? It is very easy for us to suggest that programs to aid the blind, to educate the mentally retarded, to reduce or eliminate cancer and heart disease are socially good and necessary. But, if our resources are limited, how much should be allocated to each? Maybe we should be aiming to achieve results in each of these areas and others as well. How much of our effort should be devoted to the promotion of good health habits among the population as the means for preventing ill health? How much for the treatment of disease and disability? How much for preventive measures? How much for training and rehabilitation? It is clearly necessary to determine relative priorities and to decide what must be achieved in each of the key areas.

WHAT MUST BE ACHIEVED

Having decided in what priority areas results are to be achieved, it is now necessary to decide what those results should be. Such results should be stated in such a way that we can see quite inambiguously what the outcome is intended to be. In other words, the statement should indicate what it is we are intending to achieve without, at this stage, considering how. It is not a statement of what we intend to do; it is a statement of what we intend to achieve. Obviously, the intended result should be attainable--otherwise it is just "pie in the sky." The result should also be consistent with and contributory towards the broad statement of purpose that we developed in answer to the question "What business are we in?" A most important criterion of this statement is that the result should be measurable, otherwise how will we know whether we have achieved it? For example, if the intended result were stated as "To reduce lung cancer" we invite the questions "By how much? When? At what cost? Where?" Similarly, "to educate the public in good health habits" is probably an unattainable and unmeasurable statement. Are we thinking of giving everyone a written examination to determine our results? We need to be much more specific about what it is that we are trying to achieve if we are going to know whether we have achieved it. A good statement of intended results that are desirable, attainable, measurable, ends-oriented (what is to be achieved rather than what is to be done) and specific would be "To have reduced the incidence of disease X by Y percent in City Z by 1975 at a cost not exceeding "Q". This statement states precisely what is to be achieved, where, when and at what cost without inhibiting action by stating how it is to be achieved. "How" is decided in the next step.

WHAT HAS TO BE DONE?

To determine how the intended results are to be achieved required answers to the questions "In what ways could the intended result be attained? What is the best way?" Here we have to decide what we mean by "best." Do we mean quickest, cheapest, most effective, easiest or all of these? What are the advantages and disadvantages of each alternative? Would each of them attain the required results? What are the major steps that have to be taken and in what order of priority? How long will each step take?

WHEN MUST IT BE DONE?

Having decided upon the major steps to be taken and their relative priorities, it is now necessary to consider an actual timetable. This entails breaking down the major steps into the detailed actions that have to be taken, deciding how long each will take, in what order they should be taken, which of them can proceed simultaneously and which of them are dependent upon completion of an earlier step. In this way, one can get a realistic assessment of where one hopes to be at any given period of time. We shall, hopefully, also be aware of how long the whole process will take (in weeks, months or years) and of the total effort that will be required in terms of man-hours required for each step. We can also compare this time schedule with that envisaged in the statement of intended results. Will the results be achieved on time? Is the statement still attainable or must we change it?

WHAT WILL IT COST?

Once we have a realistic timetable of events we can begin to determine what will be the cost of the necessary activity. Something like eighty percent of the cost of most activities in the health sector is taken up in salaries. If, therefore, we know how long each step will take and how many people are involved in each step, the total cost becomes relatively simple to calculate--we merely need to add the cost of other resources, such as equipment and supplies. Again, we can compare this total cost with that quoted in the statement of intended results. If the latter cannot be changed, as is often the case, we may have to think again about our method of attaining the results. Can it be done more cheaply?

WHAT DO WE HAVE TO MEASURE?

If our statement of intended results is truly measurable, we should have no difficulty in knowing whether and when we have achieved the results. But can we afford to wait until then? What happens if we get "Off track" on the way? How will we know? If we have broken down our activities into a series of detailed steps, and have timetabled and costed these steps, it should be possible at all times to determine whether we are on schedule and to take any necessary corrective action. If, however, the statement of results does not itself contain the means for measurement. We may have to establish other ways in which we can measure our results. Usually it is possible to express intended results in terms of quantity, quality, time, cost or standards.

WHOSE RESULTS?

So far we have been looking at the statement and achievement of results without saying who decides what results are required and who is responsible for achieving them. It is a fundamental part of the Management by Objectives and Results philosophy that everyone becomes involved. A system in which top management decides what must be done and the rest of the organization is responsible for doing it is nothing more than Management by Directives. It is certainly not Management by Objectives! The latter is a system of participative management in which people at every level of the organization have a say in the formulation of required results. This does not mean "permissive" management whereby everyone "does his own thing." What it does mean is that once the broad policy or guidelines have been stated, each individual should be invited to have some say in deciding what results he is to achieve and, more particularly to make some contribution to the formulation of the results to be attained by his section or unit.

The outmoded concept that people will blindly do what they are told to do, (or that everyone is committed to organizational objectives provided they know what they are), is replaced by a system in which both the manager and his staff at every level get together and jointly decide what results are desirable, attainable, contributory to and consistent with the requirements of the organization.

WHAT ARE THE ADVANTAGES?

It is, perhaps, obvious that a system which permits Joe Blow to have some say in what results are required of him and of the unit in which he works will produce a higher degree of commitment to their attainment. The process of establishing what results should be achieved at any level entails a considerable increase in vertical and lateral communication. People become much more aware of what is required of them, are able to see the results of their endeavours, to experience "ownership" of these results and to enjoy a sense of achievement. In motivational terms, there is greater scope for teamwork, for delegation of responsibility and authority, for the development of people and for professional advancement. The manager may even find that he has time available for planning, which is where we began.