# Infosheet #2 Water Wells

This infosheet provides background to Worksheet #2 of the *Environmental Farm Plan Workbook*. It outlines options you could adopt to address problem areas in your operation. In most cases you'll need more information before implementation: please refer to the resource materials listed in the infosheet, and consult OMAF Environmental Farm Plan (EFP) Technical Advisors.

All options are classed as Actions or Compensating Factors. Actions address the areas of concern identified, and will change the EFP rating to (3) or Best (4). Compensating Factors are alternatives that will adequately address the concerns, but will not change the rating in the EFP worksheets.

March 2005

## Location of well

| ISSUE | WHAT CAN YOU DO? |
|---|---|

### 2-1 Position of water well in relation to potential sources of contamination

Ground water often moves underground in the same general direction as the surface water. If ground water is contaminated upslope from your well, the contamination may show up in your well making the water unfit to drink.

If contaminated water is allowed to flow close by, or (even worse) to pond near the well, the benefits of position are lost.

Ask yourself: is your well downslope from contaminant sources? If yes, will runoff flow close to the well? Is there any chance of ponding around the well?

**OPTION #1 – ACTION**

**Move upslope contaminant sources to location downslope of the well:**

- if you are considering improvements to storages of manure, pesticides, or fuels (e.g. fixed-point contaminant sources), bear in mind the location of your well.

**OPTION #2 – ACTION**

**Move your well upslope of all potential contaminant sources:**

- make sure old well is properly removed from use (abandoned according to Ontario Regulation 903)
- moving your well is viable only if the existing well is being replaced due to age, condition, unacceptable water quantity or quality
- make sure that the location of your new well is outside of the known or suspected floodplain.

**OPTION #3 – COMPENSATING FACTOR**

**Direct surface drainage from contaminant sources away from your well:**

- depending on local topography, surface water can be redirected by means of land reshaping, grassed waterways, etc.

OMAFRA = Ontario Ministry of Agriculture and Food; MOE = Ontario Ministry of the Environment

- existing surface drainage should prevent ponding in the vicinity of the well – regrade if necessary, by building up ground around the well and sloping ground away from it.

**OPTION #4 – COMPENSATING FACTOR**

**For potential contaminant sources that have proper storage(s) or containment, monitor regularly:**

- check for leaks, cracks, seepage or overtopping.

**FOR MORE INFORMATION**

Best Management Practices Book*: Water Wells*, Order No. BMP 12, pp. 33-35

*Water Wells* Video, Town and Country Ontario Television

## 2-2 Distance from well to potential sources of contamination

An important factor in maintaining good ground water quality is the horizontal distance between your well and the potential contaminant source.

Minimum separation distances between your well and potential contaminant sources are specified in Regulation 903 of the *Ontario Water Resources Act*. These separation distances are actively enforced when a new well is constructed or when a new septic system is installed. Any well constructed after 1984 must have met the minimum separation distance at time of well construction. In general, the potential for your well water to become contaminated, decreases as the distance between the well

**OPTION #1 – ACTION**

**Move your well to a distance that achieves a (3) EFP distance rating:**

- make sure old well is properly removed from use (abandoned according to Ontario Regulation 903)
- moving your well is viable only if the existing well is being replaced due to age, condition, unacceptable water quantity or quality
- make sure that the location of your new well is outside of the known or suspected floodplain.

**OPTION #2 – COMPENSATING FACTOR**

**Identify the potential contaminant source(s) that is too close (EFP distance rating of 1 or 2) and deal with the actions in the individual Infosheets related to those contaminant source(s) identified.**

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 33-35; *Water Management*, Order No. BMP 07, pp. 15-16

and the sources of contamination increases. Maintaining as much separation distance as possible between the water well and the potential contaminant source is an excellent best management practice to help protect the quality of water in the well.

In general, finer-textured soils slow water movement, allowing more opportunity for filtering and cleaning. Soil type indicates whether additional attention and water testing are warranted. However, a low permeability soil type (clay) doesn't guarantee full protection, just as a high permeability soil type (sand) doesn't necessarily mean that your water is or will be contaminated. Bedrock is often fractured. Exposed bedrock or shallow soil depths over bedrock/water table offer very little or no protection.

## Condition of Well

### 2-3 Condition of casing

A visual inspection of the well casing, and well vent should be part of your annual well maintenance program.

The purpose of the well casing is to provide a safe pathway to access an underground water source. **It must be installed and sealed**

**carefully so that the well does not act as a link between surface water and ground water sources or for water to move from**

**OPTION #1 – ACTION**

**Inspect well casing at least once every 2 years and repair any problems or replace any faulty materials as required.**

- visually inspect the well casing as part of your annual well maintenance program
- large diameter bored/dug wells are easier to inspect than small diameter drilled wells. The assistance of a licensed water well contractor may be needed to do an inspection of a drilled well.
- repair or replace casing as needed. Consult with a licensed water well contractor.

**OPTION #2 – COMPENSATING FACTOR**

**Properly abandon existing well and replace with new well**

- if it is not technically feasible or not economically reasonable to repair the existing well,

**one ground water source to another.** Water is supposed to enter the casing from the bottom. If your visual inspection tells you water is entering through the sides, this means water isn't following the natural flow path and could be contaminated. This can pose a health risk to you and possibly contaminate the aquifer from which the drinking water originates. It's easier to visually inspect a bored or dug well than a drilled well.

properly abandon the existing well and construct a new one.

**Note: Ontario Regulation 903 under the *Ontario Water Resources Act* specifies that a new well that is dry, or an existing well that is not being used or is not maintained to minimum standards, must be abandoned according to the specifications set out in the Regulation.**

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-63, 65-67; *Water Management*, Order No. BMP 07, pp. 8-9, 14-16

*Green Facts: Important Facts About Water Well Construction,* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Get Acquainted with Your Well*, MOHLTC Factsheet

*Water Wells* Video, Town and Country Ontario Television

## 2-4 Condition of well cap

A visual inspection of the well cap should be part of your annual well maintenance program.

The well cap is intended to keep rainfall, surface water, and undesirable materials from directly entering the well. For large diameter wells (i.e., bored and dug), safety can be an issue. People or children can walk or climb onto the well cap so it is necessary to be strong enough to support them. In the case of children, the cap should be secure or heavy enough that the cap cannot be removed by them.

### OPTION #1 – ACTION

**Repair any problems or replace any faulty materials as required.**

- a visual inspection of the well cap should be part of your annual well maintenance program
- the well cap should be commercially manufactured and vermin proof
- if well cap is loose, tighten it
- if well cap is damaged, repair or replace it

**Bored or dug wells**

- caps on dug or bored wells should be safe enough to stand on, keep out rain water and debris, have no cracks, and be child proof (e.g. concrete lid)

**Drilled wells**

- drilled well caps should be tightly secured without structural defects (e.g cracks etc.)

### OPTION #2 – ACTION

**If cap is missing, install a proper (commercially manufactured and vermin proof ) cap.**

### OPTION #3 – COMPENSATING FACTOR

**Properly abandon existing well and replace with new well.**

- if it is not feasible or not economically reasonable to repair the existing well, properly abandon the existing well and construct a new one.

### FOR MORE INFORMATION

Best Management Practices Books*: Water Wells,* BMP Order No. 12, pp. 37-39, 42, 48-52, 54-63, 66-67; *Water Management*, BMP Order No. 07, pp. 8-9, 14-16

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

## 2-5 Condition of well venting

A visual inspection of the well vent should be part of your annual well maintenance program.

The well vent allows potentially dangerous and explosive gases (e.g., methane) to escape the well. Well vents must be screened or protected to prevent undesirable materials, insects, and small animals from entering the well through the vent.

**OPTION – ACTION**

**Install appropriate vent and screening.**

- a visual inspection of the well vent should be part of your annual well maintenance program

  **Bored or dug wells**

  - dug or bored wells with concrete lids are considered vented. Screening is generally not required here. The lid should fit tight enough to keep out debris, insects, and small animals.

  **Drilled wells**

  - if they have sanitary caps with electrical wiring going through the cap, they are considered vented unless sealed with caulking
  - well vent can be a small opening in the well cap, or be a small pipe extending upward from the well cap
    - in either case, openings should be screened
  - drilled wells with caps below ground surface do not meet current standards
    - venting should be installed
    - extend water well casing to at least 40 cm. (16 inches) above ground surface

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-39, 42, 48-52, 54-63, 66-67; *Water Management*, Order No. BMP 07, pp. 6-9

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

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*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

## 2-6 Condition of surface material around the well casing

Water well sealing materials fill the space between the drill borehole or excavation wall and the well casing. Their purpose is to prevent surface water or shallow ground waters from seeping directly into the well and to prevent them from seeping into deeper ground water supplies along the casing. If the well seal fails to prevent this seepage then your well and other wells can become contaminated.

In almost all cases, settling or cracking of **water** well sealing materials results from the use of improper materials or the improper placement of these materials.

## 2-7 Casing depth

The deeper the water source for the well, the more opportunity there is for soil to naturally filter and clean the water before it's used.

Drilled wells have a watertight casing (usually steel) that sometimes extends to the bottom of the well and in other situations only part way down (i.e., to bedrock). The depth to which the watertight casing extends is an indicator of the minimum distance that water has to travel through the soil before it can enter the well and then be used. There are

Best Management Practices Book: *Water Management*, Order No. BMP 07, pp. 6-9

**OPTION #1 – ACTION**

**Consult a licensed water well contractor for advice on what to do.**

**OPTION #2 – ACTION**

**Carefully excavate the area surrounding the casing and backfill with an approved sealing material to the ground surface:**

- approved materials include bentonite slurry, cement grout or concrete
- caution! Care must be taken not to damage the casing during this procedure.

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-39, 52-59; *Water Management*, Order No. BMP 07, page 14

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

**OPTION #1 – ACTION**

**Extend casing of drilled wells to a depth greater than 30 metres (100 feet):**

- drilled wells are easily installed to depths greater than 30 metres (100 feet), but this will be inappropriate and should not be done in some areas due to poorer naturally occurring water quality (sulphur, salt, iron etc.), or lack of water at those depths.

**OPTION #2 – COMPENSATING FACTOR**

**Ensure that depth of casing meets minimum requirement for type of well and soil profile and monitor water quality regularly.**

- drilled wells should have a minimum of 6 metres (20 feet) of sealed casing. Bored/dug wells should have a minimum of 3 metres (10 feet) of sealed casing unless the water source is less than 3 metres (10 feet) deep. Wells less than 3 metres (10 feet) deep should not be

exceptions though (e.g., artesian flowing wells, etc.)

Bored and dug wells use large-diameter concrete or steel casing, which are harder to make watertight. And although the water generally enters the well from the bottom, it can sometimes enter through the sides if the casing joints are not sealed properly.

**Note**: Do not adjust your rating for naturally occurring water quality problems, such as salty water and sulphur.

used
- maintain the well and surrounding area.

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-39, 52-54, 68; *Water Management,* Order No. BMP 07, page 14

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

## 2-8 Casing height above ground level

Your well can be a direct pathway from the ground surface to the ground water source. If contaminated surface water enters the well through the top, water quality in the well and aquifer are in jeopardy.

The well casing must extend high enough above ground to prevent surface water entering the well in the event of flooding or ponding around the well.

Regulation 903 of the *Ontario Water Resources Act* **specifies** casing height.

### OPTION #1 – ACTION

**Extend casing of bored, dug, sandpoint or drilled well to 40 cm (16 inches) or higher above the surrounding ground surface.**

- consult with a licensed water well contractor for advice and assistance.

### OPTION #2 – ACTION

**For drilled wells in a well pit, extend the casing to a minimum of 40 cm (16 inches) above the surrounding ground surface and properly fill in pit.**

- consult with a licensed water well contractor for advice and assistance.

### OPTION #3 – COMPENSATING FACTOR

**For drilled wells in a well pit, extend the casing to a minimum of 40 cm (16 inches) above the floor of the pit, and ensure that the well vent pipe extends 40 cm (16 inches) above the surrounding ground surface. The drilled well cap must be water tight (sanitary seal) and the well pit should be sealed or continuously drained.**

- consult with a licensed water well contractor for advice and assistance
- it is important to keep water from entering the drilled well from the well pit. The risk of contamination is high.

### FOR MORE INFORMATION

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-58; *Water Management*, Order No. BMP 07, page 14

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Get Acquainted with Your Well*, MOHLTC Factsheet

*Water Wells* Video, Town and Country Ontario Television

## 2-9 Age of well

Your well's age is an indicator of the technology used in its construction, and the casing and cap. The well casing may be sufficiently deteriorated to allow water to enter the well near the surface.

Some dug wells were built a century ago, when walls were built from stones and bricks. Old wells constructed in this manner are very susceptible to contamination from surface sources of pollution because the joints between the stones or bricks were usually never sealed.

### OPTION #1 – ACTION

**Replace the old well with a new well**

- well replacement is viable only if factors besides age dictate (e.g., impaired water quality, irreparable damage to casing)
- a well in good condition should not be replaced because of age
- monitor and maintain well on regular basis.

Note: Remember that the old well being replaced must be abandoned according to Ontario Regulation 903 if it is no longer to be used or you do not intend to maintain it to minimum standards.

### OPTION #2 – COMPENSATING FACTOR

**Upgrade well to present day standards.**

- repair existing casing (e.g., grout joints) or install new casing (e.g., install new casing inside existing bored/dug well casing) and have it properly sealed and protected.

### OPTION #3 – COMPENSATING FACTOR

**Carefully inspect condition of water well, especially for deterioration of casing.**

- ensure the water well is in good condition
- casing material may have corroded or deteriorated to the point of water leaking into well
- a Licenced Well Contractor can be of great assistance
- test water quality at least three times per year.

### FOR MORE INFORMATION

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 37-58; *Water Management*, Order No. BMP 07, pp. 8-9, 14-16

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

## 2-10 Type of well

In general, all types of wells, provided that they are constructed to accepted standards, can provide a safe and reliable supply of water. The depth, quantity, and quality of ground water in your area often dictates what type of well you may have.

Drilled wells often provide more protection from surface sources of pollution because they can be drilled to greater depths and are easier to seal than are dug or bored wells. Drilled wells are generally more dependable in both quantity and quality.

Bored or dug wells obtain water from a shallower source, which is more easily affected by surface activities and rainfall. The larger bore hole and casing are more difficult to seal and maintain.

Any deep hole drilled or dug into the ground provides a potential path for contaminants to reach the ground water, and must be managed accordingly.

All four well types must be constructed in accordance with Regulation 903 of the *Ontario Water Resources Act*.

### OPTION #1 – ACTION

**When replacing a bored/dug or sandpoint water well consider a drilled well where feasible**

- well type indicates level of management required to maintain water quality
- regardless of well type, remember to monitor and maintain your well
- bored/dug wells do not need to be replaced if they are in good condition, properly managed and provide good quality and safe drinking water.

### OPTION #2 – COMPENSATING FACTOR

**Properly manage, maintain, and protect the water well (regardless of type) as outlined in the infosheet. Test water quality at least three times per year.**

### FOR MORE INFORMATION

Best Management Practices Books*: Water Wells,* Order No. BMP 12pp. 37-58; *Water Management*, Order No. BMP 07, pp. 8-9, 14-16

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Keeping Your Well Water Safe to Drink*, MOHLTC Poster

*Get Acquainted with Your Well*, MOHLTC Factsheet

*Water Wells* Video, Town and Country Ontario Television

# Management of water supply

## 2-11 Backflow prevention

The well and plumbing system is designed to bring clean water to the surface. If you don't take precautions, it can also conduct liquids in the opposite direction.

Water from the tap or hose is used to fill large and small containers that may have potential contaminants in them, such as sprays, soaps, fertilizers, etc. These can back into the plumbing system or well, endangering human health. Costs for cleanup can be very high.

The foot valve associated with pumps in wells does not provide adequate protection against backflow of possible contaminants into the well. Although it can prevent material from getting into the well if it is functioning properly, contaminants can still be siphoned into the water lines.

**OPTION – ACTION**

**Install anti-backflow devices on all outside faucets, or faucets that are used to fill containers with a hose and maintain a 15 cm (6-inch) air gap between liquid level and hose end.**

- if more than one well is in use, operate them as separate systems, or separate them by manually controlled valves.

**Types of anti-backflow devices**

- vacuum breakers are inexpensive anti-backflow devices that simply screw onto the tap and prevent liquids from siphoning back into the water system but material can still be siphoned onto the ground surface
- more expensive anti-backflow devices prevent liquids from siphoning back into the water system or onto the ground; in-line check (one-way) valves are better protectors. They can be installed inline between the pressure tank and the tap but usually just before the outside tap.

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, page 65; *Water Management,* Order No. BMP 07, page 17

## 2-12 Unused or abandoned wells

Unused and improperly abandoned wells are pathways for contaminants to move into ground water. These wells must be identified and maintained, or properly plugged (abandoned according to Ontario Regulation 903). If improperly filled in, they may need to be dug up and plugged properly.

**OPTION #1 – ACTION**

**If an unused water well is to remain in place, it must be maintained and managed.**

- unused water wells are considered active and should be included in your overall plan as an active water well.

**OPTION #2 – ACTION**

**Properly, abandon the well(s) according to Ontario Regulation 903.**

- obtain professional advice from and/or the services of a Licensed Water Well Contractor
- send report of well location and how it was plugged to MOE.

If you are currently using a particular well for livestock or emergency purposes only, you must still maintain it.

When a water well is abandoned (plugged properly), a report should be sent to the Ontario Ministry of the Environment indicating location of water well, type of well, and details of plugging.

**Note:** Previously abandoned wells should be investigated to determine if they were properly plugged. A licensed water well contractor can assist you.

**FOR MORE INFORMATION**

Best Management Practices Book*: Water Wells,* Order No. BMP 12, pp. 48-50, 60-63

*Get Acquainted with Your Well*, MOHLTC Factsheet

*Green Facts: Important Facts About Water Well Construction* – PIBS No. 3788e01, 2003.
*Green Facts: The Protection of Water Quality in Bored and Dug Wells*– PIBS No. 3962e01, 2003.
*Green Facts: The Protection of Water Quality in Drilled Wells* – PIBS No. 3961e01, 2003.
*Green Facts: The Protection of Water Quality in Jetted or Driven Point Wells* – PIBS No. 4505e, 2003.

*Water Wells* Video, Town and Country Ontario Television

## 2-13 Water testing

Contaminated water is often very difficult to identify with our senses. Regular testing will indicate if any changes in water quality are occurring. Results will also indicate what treatment methods are warranted, and why.

**OPTION – ACTION**

**Test water for indicator bacteria at least three times a year, and once a year for other parameters (such as nitrate)**

- test water from all wells that have not been abandoned
- if materials have been spilled near the well, or are of concern contact MOE to determine the appropriate test procedures
- for interpretation of test results contact the local Public Health Unit.

**FOR MORE INFORMATION**

Best Management Practices Books*: Water Wells,* Order No. BMP 12, pp. 73-77; *Water Management*, Order No. BMP 07, pp. 17-18

*Get Acquainted with Your Well*, MOHLTC Factsheet

*Keeping You Well Informed*, MOHLTC Factsheet
*Pathogens and Your Well Water*, MOHLTC Factsheet
*Putting Your Well Water to the Test*, MOHLTC Factsheet
*Choosing a Water Treatment System*, MOHLTC Factsheet
*Disinfection Instruction Sheet*, MOHLTC Factsheet

*Keeping Your Well Water Safe to Drink*, MOHLTC Poster

*Water Wells* Video, Town and Country Ontario Television

*Ontario's Drinking Water Objectives*, MOEE Information Sheet #2054b
*Water Quality for House and Barn*, OMAF Factsheet, Order No. 87-026

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*At the request of the **Ontario Farm Environmental Coalition**, consisting of Ontario Federation of Agriculture, Christian Farmers Federation of Ontario, AGCare, and the Ontario Farm Animal Council, the following people contributed to the development of Infosheet #2:*

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