



Thomas C. Jorling
Commissioner

December 13, 1990

MEMORANDUM

TO: Regional Water Engineers, Bureau Directors, Section Chiefs

SUBJECT: Division of Water Technical and Operational Guidance Series
(2.1.1)
GROUNDWATER CONTAMINATION REMEDIATION STRATEGY
(Originator: Mr. Halton)

I. PURPOSE

To establish strategies for source control and remediation of groundwater contamination.

II. DISCUSSION

This document applies to chronic groundwater contamination incidents for which the Division of Water (DOW) has lead responsibility for source control and groundwater remediation. These cases are identified in the August 14, 1984 MOU between DOW and the Division of Solid and Hazardous Waste (DSHW). The MOU says that DOW has lead responsibility if the source of the groundwater contamination is:

1. Any recurring point source discharge.
2. Petroleum or chemical products which, if leaked or spilled, would not constitute a hazardous waste under RCRA/Part 370.
3. Leaks or spills of waste materials other than hazardous wastes.
4. Unknown.

This document does not apply to immediate or short-term response to spills, or to cases for which DSHW has lead responsibility.

DOW is responsible for the site investigation, at least until the source is identified. However, this document assumes that a site investigation has already taken place. It considers two issues; the control of continuing sources of contamination and the remediation of contaminated groundwater plumes (see figure 1).

III. GUIDANCE

1. Step I deals with on-going sources of contamination (see figure 2). "Source Control"⁽¹⁾ will be required if there is a violation of water quality standards (ground or surface).

(1) - See Glossary

A source control program must eliminate the violation if technologically feasible. If not, the program must accomplish all that is technologically feasible. Cost will not be considered.

2. Step II addresses remediation of the contaminated groundwater plume (see figure 3). "Plume Management"⁽¹⁾ will be required if a determination is made that the existing or potential use of a water resource is threatened or if there are or will be other adverse public health or environmental impacts (e.g. chemical fumes in people's basements, impact on wetlands, etc.).

Where the site is in an area overlaying a primary or principal aquifer, or within the recharge area of any public or institutional water supply, violation of groundwater standards shall be deemed sufficient proof of "impairment".⁽¹⁾ In other areas, it must be determined that the violations/impacts are of a sufficient extent and magnitude as to constitute an impairment.

In determining the objectives of plume management at any specific site, we will consider the cost of various plume management alternatives versus the benefits of each. Our goal is to restore the groundwater to compliance with groundwater standards (or background conditions, if background water quality does not meet standards), if cost-effective⁽¹⁾. However, the minimum requirement is that the impairment be eliminated if technologically feasible. In that regard, cost is not considered.

3. Step III addresses termination of the plume management program (see figure 4).

If its objectives are achieved, the plume management program ceases. However, in many cases, a plume management program reaches a point of diminishing returns or "dead end"⁽¹⁾ where monitoring indicates that little further progress is being achieved in improving groundwater quality.

If it is determined that an unacceptable impairment would still exist, then plume management shall continue in such cases unless there are feasible alternatives (e.g. relocation of residents, connection to alternative water supply, etc.).

If the impairment has been or may have been reduced to a tolerable level, we will evaluate the costs and benefits of continuing, and the program will terminate if and when it is no longer cost-effective.

Thus, if we run into an apparent "dead end" in a plume management program, Step III gives us the flexibility to reevaluate the determination that the Department made in Step II with regard to what the plume management program must accomplish.

Responsibilities

1. The RWE, in consultation with BSPR, has the following responsibilities:
 - a. Final selection/approval of source control and plume management programs.

- b. To determine when an impairment exists.
 - c. To decide if termination of a plume management program can be considered, or, if not, to decide if there are any acceptable alternatives to continuing.
 - d. To provide overall supervision and coordination for all site investigations, monitoring, negotiations with the owner, assemblage of case reports, and liaison with the Regional Attorney on enforcement cases.
2. BSPR, in consultation with the RWE, has the following responsibilities:
- a. To conduct detailed hydrogeologic evaluations of the site at the request of the RWE and to identify sources of contamination where possible.
 - b. To advise on all hydrogeologic technical issues, including site monitoring, evaluation of consultant reports, and options for plume management and source control. Review of cost/benefit data.
 - c. To render the decision on when a plume management effort has reached a technical "dead end".
3. BWFD/BMA, in consultation with the RWE, are responsible for the regulation of any point source discharge from the site to ground or surface waters.
4. NYSDOH shall be consulted by the RWE regarding:
- a. Acceptable levels of chemicals in drinking water, if not covered by existing water quality standards.
 - b. Acceptability of public water supplies.
 - c. Risk assessment regarding residual contamination.

Glossary

- 1. Source Control - A program consisting of one or more measures to remove or immobilize a continuing source of groundwater contamination. Examples of such measures are excavation, in-situ biological or chemical treatment, recovery wells, containment wells, etc.
- 2. Plume Management - A program consisting of one or more measures to eliminate, reduce, or immobilize a plume of contaminated groundwater. Examples of such measures are purge wells, containment wells, etc.
- 3. Impairment - As used here, this term includes any unacceptable environmental impact (e.g. chemical fumes in basements) as well as damage to water resources.
- 4. Cost-Effective
 - a. Step II (f): Given that a minimal plume management program must eliminate the impairment if technologically feasible, it is cost-effective to expand the program if the incremental cost is less than the monetary value of the additional resources that would be recovered.

- b. Step III (g): Continuing a plume management program that has reached an apparent dead end is cost-effective if the incremental cost of continuing is less than the monetary value of the additional resources that might reasonably be recovered.
5. Dead End - A point at which improvement in groundwater quality proceeds at a very low rate. This can occur even when purge wells are still very productive in removing contaminants.
6. NAPL - Non-Aqueous Phase Liquid, consisting of chemical or petroleum product mixed with water at levels above the limit of solubility. If left standing, a sample will separate into an aqueous layer and one or more organic layers. The presence of NAPL usually defines the boundaries of the "source".
7. APL - Aqueous Phase Liquid, consisting of a solution of chemical or petroleum product in water. The presence of APL, without NAPL, defines the boundaries of the plume.


Salvatore Pagano
Director
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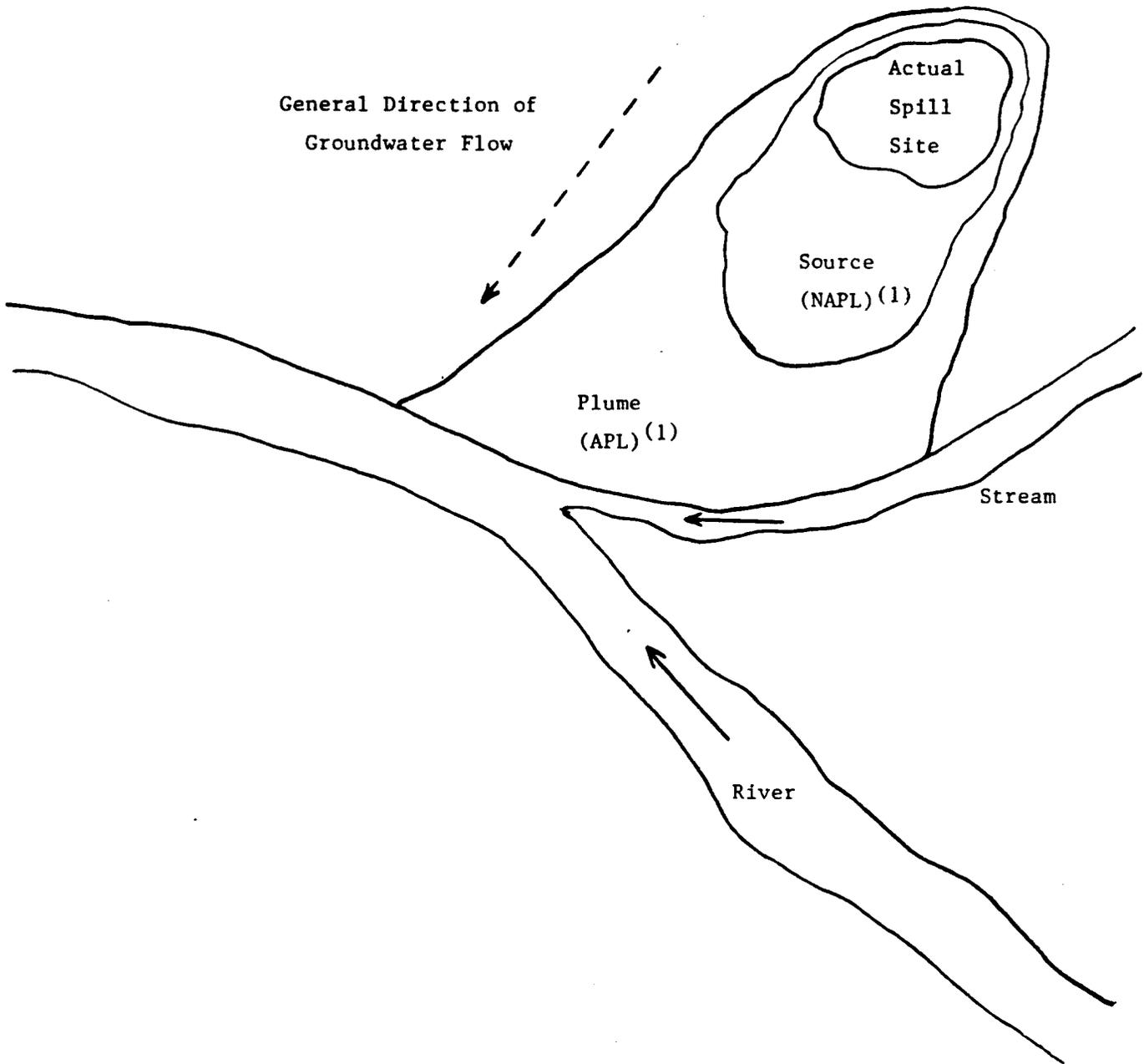
Attachment

cc: Dr. Banks
Mr. Campbell
Ms. Chrimes
Mr. Bruening
Regional Directors for Environmental Quality

DBH:mak

Figure 1

Groundwater Contamination by Past Chemical Spill



(1) - See Glossary

Figure 2

Step I - Source Control

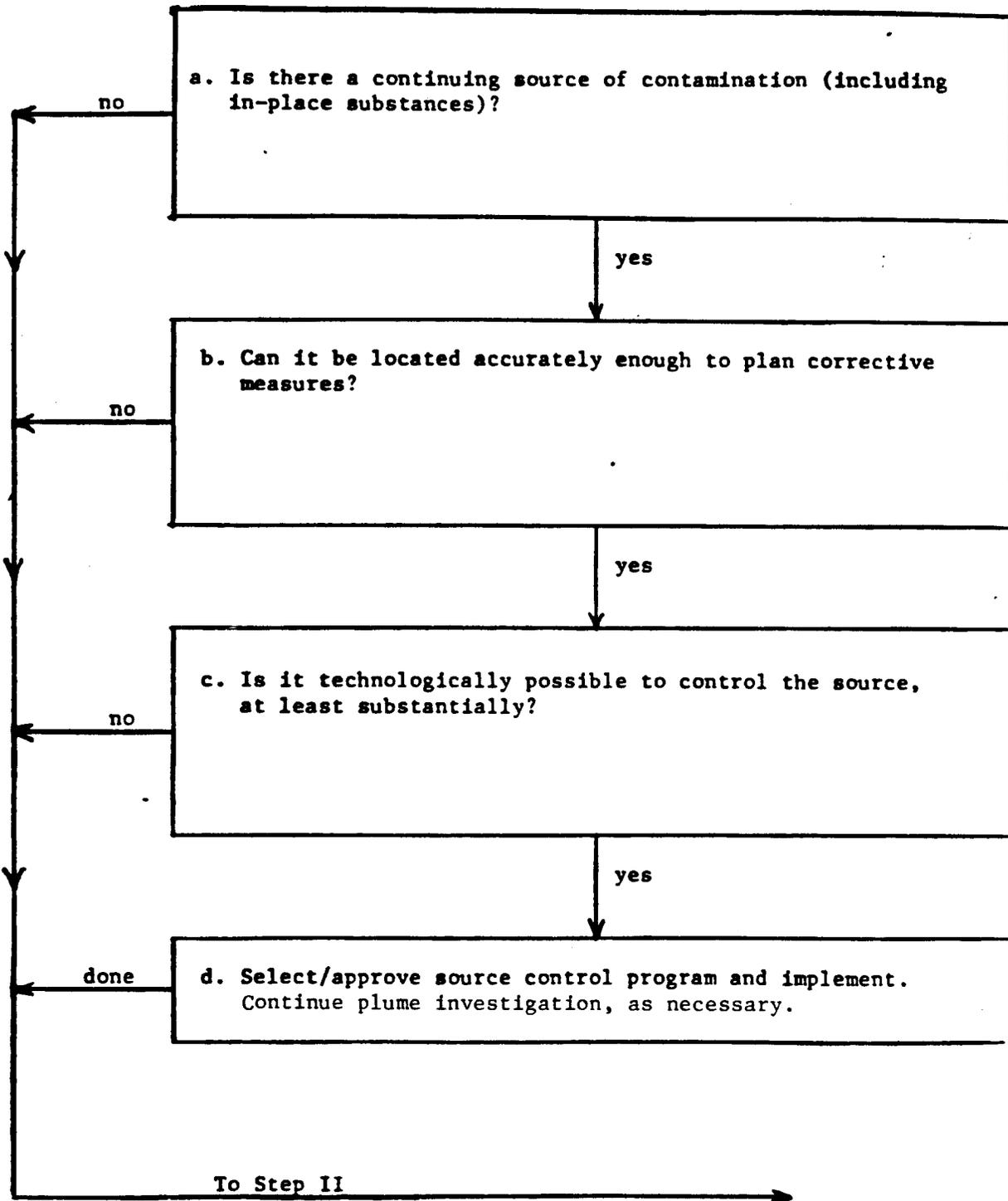


Figure 3

Step II - Plume Management

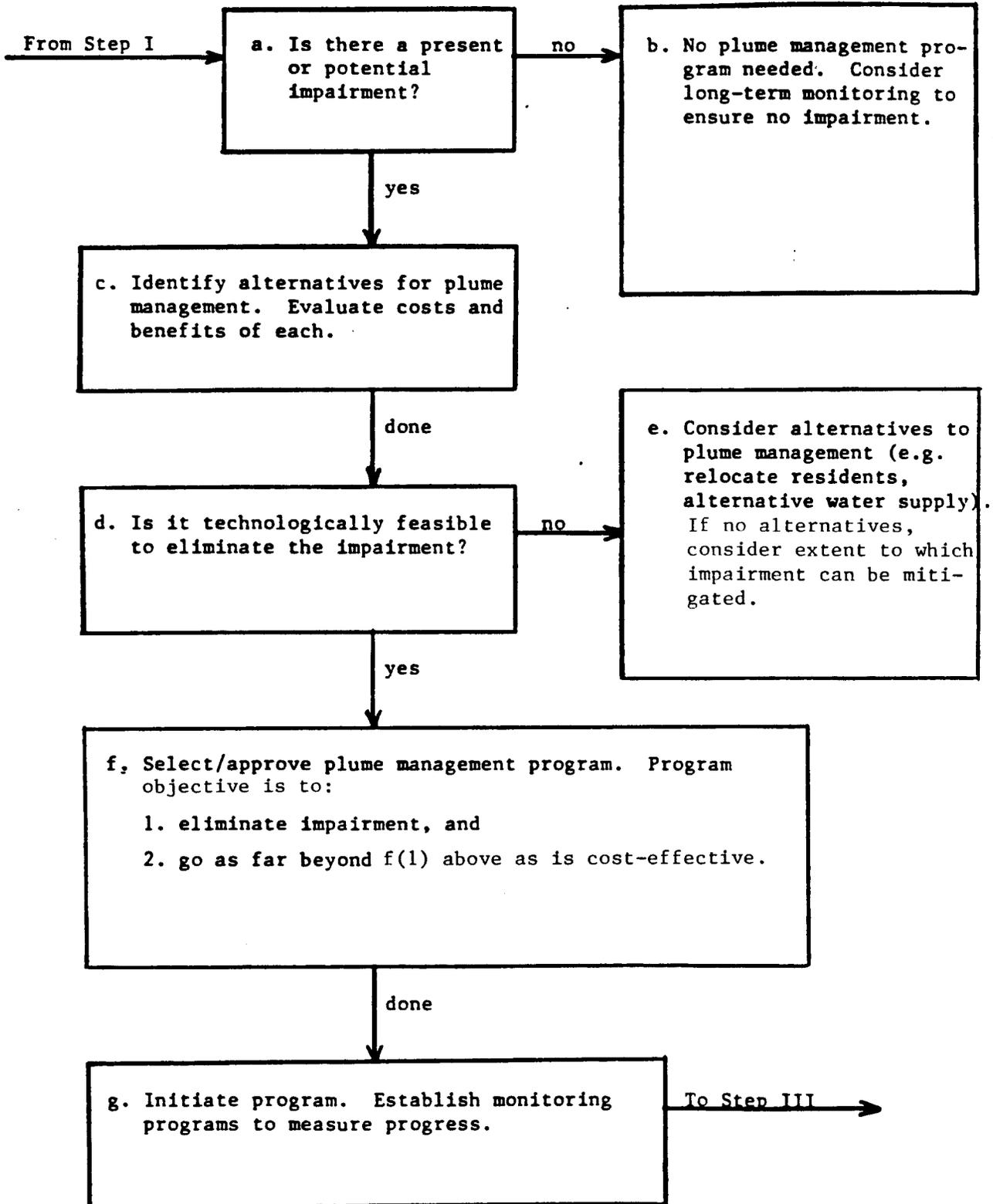


Figure 4

Step III - Termination

