REVISION OF AGENCY GUIDANCE FOR EVALUATION OF LAND TREATMENT ALTERNATIVES EMPLOYING SURFACE APPLICATION

CONSTRUCTION GRANTS
PROGRAM REQUIREMENTS MEMORANDUM
PRM 79-3

Prepared for
Environmental Research Information Center

Seminar on
Land Treatment of Municipal Wastewater Effluents

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ENVIRONMENTAL RESEARCH INFORMATION CENTER
OFFICE OF RESEARCH AND DEVELOPMENT
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WASHINGTON, D.C. 20460

NOV 15 1978

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SUBJECT: Revision of Agency Guidance for Evaluation of Land Treatment Alternatives Employing Surface Application

FROM: Thomas C. Jorling, Assistant Administrator
Water and Waste Management (WH-556)

TO: Regional Administrators (Regions I thru X)

I. PURPOSE

This memorandum consolidates and updates Agency policy and guidance for evaluation of land treatment alternatives using slow rate, rapid infiltration, or overland flow processes in the Construction Grants Program. It provides guidance on the extent and nature of material to be included in facility plans to ensure that these land treatment alternatives have been given thorough evaluation.

II. DISCUSSION

Evaluation of land treatment in facilities planning has been mandatory under PL 92-500 (the Act) since July 1, 1974. The EPA construction grants regulations as published in the Federal Register vol. 39, no. 29, February 11, 1974, provided for coverage of land application techniques in facility planning [35.917-1(d)(5)(iii)]. Three land application (land treatment) techniques were included in the description of alternative techniques for best practicable treatment published in October 1975. Many other technical information bulletins, PGM's, and PRM's have been issued as guidance for the evaluation of land treatment alternatives in the Construction Grants Program.

This approach was used to provide the latest information available to the Regional Offices with a minimum of delay. While the objective of timely distribution of technical information and guidance has been achieved, this piecemeal distribution has also resulted in some disparities in the interpretation and implementation of policy.

Distribution of the Process Design Manual for Land Treatment of Municipal Wastewater (EPA 625/1-77-008) consolidates most of the technical information on surface application approaches into a single reference source. This consolidation of technical information provides a sound basis from which to establish more consistent and effective implementation of Agency policy on land treatment alternatives using the slow rate, rapid infiltration, or overland flow processes.

In the process of coordinating with the Regions on specific projects involving land treatment, OWPO staff has had the opportunity to review a number of selected facility plans with respect to their handling of land treatment alternatives. In addition to providing information pertinent to the specific projects being evaluated, this review has been used to determine what, if any, changes in guidance are needed to achieve more consistent and complete evaluation of land treatment alternatives. Areas being considered include technical assistance and staff training as well as revision of guidance documents.

The results of this review to date show that land treatment technologies have had and continue to have inadequate assessment in many instances. In addition and for substantially more cases, detailed coverage of land treatment has missed the mark for a variety of reasons. Three of the frequently encountered reasons are: (1) overly conservative and, consequently, costly design of slow rate (irrigation) systems, (2) failure to consider rapid infiltration as a proven and implementable land treatment alternative, and (3) provision for a substantially higher and more costly level of preapplication treatment than is needed to protect public health and ensure design performance.

Such inadequate assessment of land treatment alternatives has led to rejection of land treatment in cases where it appears that a thorough assessment would identify less costly alternatives utilizing the recycling and reclamation advantages of land treatment. Consistent with the revised construction grants regulations resulting from enactment of PL 95-217, award of Step 1 grants and subsequent approval of facility plans must ensure that the selected alternative is cost-effective and emphasizes energy conservation and recycling of resources. This is important both to meet the statutory requirements of the law and to provide the maximum pollution control benefits attainable with the funds allocated to the Construction Grants Program.

The Administrator's memorandum of October 3, 1977, emphasizes that the Agency grants program will include thorough consideration of land treatment as compared to conventional treatment and discharge to surface waters.

This program requirements memorandum is designed to consolidate the existing base of guidance into a uniform but still flexible set of guidelines for slow rate, rapid infiltration, and overland flow systems. This should improve our capability to effectively and consistently implement the Agency policy on recycling and reclamation through land treatment alternatives.

III. POLICY

The Administrator's memorandum of October 3, 1977 (Attachment A) spells out three major points of policy emphasis on land treatment of municipal wastewater as follows:

1. The Agency will press vigorously for implementation of land treatment alternatives to reclaim and recycle municipal wastewaters.

2. Rejection of land treatment alternatives shall be supported by a complete justification (reason for rejection shall be well documented in the facilities plan).

3. If the Agency deems the level of preapplication treatment to be unnecessarily stringent, the costs of achieving the excessive level of preapplication treatment will not be considered as eligible for EPA cost sharing when determining the total cost of a project.

These points highlight the Agency's role in implementing the legislative mandates of PL 92-500 and PL 95-217. PL 92-500 required EPA to encourage waste treatment management that recycles nutrients through production of agriculture, silviculture, or aquaculture products. PL 95-217 re-emphasizes the intent to encourage innovative/alternative systems including land treatment with many tangible incentives including (1) the "115%" cost preference, (2) 85% Federal grants with the specific set asides, (3) the eligibility of land for storage, and (4) 100% grants for modification or replacement if project fails to meet design criteria. It is imperative that the Agency moves positively and uniformly to implement land treatment which is clearly identified as an innovative/alternative technology which recycles nutrients and conserves energy in conjunction with wastewater management.

IV. IMPLEMENTATION

The guidance detailed in this PRM will apply to all facility planning grants (Step 1) awarded 30 days after the date of this PRM. In addition it should be applied on a case-by-case basis to those unapproved facility plans for which it appears that further assessment of land treatment alternatives could result in: (1) the timely and effective implementation of a reclamation and recycling alternative; and (2) benefits to the applicant while making better use of EPA construction grant funds.

A. Action Required

Facility plans in which land treatment alternatives are eliminated with only cursory coverage will be rejected as not fulfilling Agency requirements. A facility plan should not be approved until the coverage of these land treatment alternatives satisfies the guidance detailed

below. As a minimum, the coverage of these land treatment processes will include assessment of at least one slow rate (irrigation) alternative and one rapid infiltration alternative. Coverage of an overland flow alternative will be optional (case-by-case) until additional information which is presently being developed furnishes design information for routine construction grant implementation. The technical design basis of these land treatment alternatives will be in accordance with the "EPA Design Manual on Land Treatment" (EPA 625/1-77-008), and "Costs of Wastewater Treatment by Land Application" (EPA 430/9-75-003). To be adequate, coverage of these land treatment alternatives shall include enough detail to support development of costs, except in those cases where thorough screening for available sites shows no suitable sites within economic transport distances. Designs for slow rate systems and rapid infiltration systems will include preapplication treatment which is in accord with the discussion of preapplication in the Design Manual (pages 5-26 thru 5-30) and summarized in Attachment B.

A universal requirement to reduce biochemical oxygen demand and suspended solids to 30 mg/l and to disinfect to an average fecal coliform count of 200/100 ml will be considered as excessively stringent preapplication treatment if specified for all land treatment alternatives. States shall be requested to reconsider use of such universal and stringent preapplication treatment requirements when it is established that a lesser level of preapplication treatment will protect the public health, protect the quality of surface waters and groundwater, and will ensure achievement of design performance for the wastewater management system.

States should be encouraged to adopt standards which avoid the use of uniform treatment requirements for land treatment systems, including a minimum of secondary treatment prior to application to the land. The EPA guidance on land treatment systems specifies ranges of values and flexible criteria for evaluating factors such as preapplication treatment, wastewater application rates and buffer zones. For example, simple screening or comminution may be appropriate for overland flow systems in isolated areas with no public access, while extensive biochemical oxygen demand and suspended solids control with disinfection may be called for in the case of slow rate systems in public access areas such as parks or golf courses.

B. Specific Guidance

The scope of work for preparation of a facility plan will provide for thorough evaluation of land treatment alternatives. This evaluation of land treatment alternatives may be accomplished in a two-phase approach. Such a two-phase approach would provide flexibility for establishing general site suitability and cost competitiveness before requiring extensive on-site investigations. The first phase of the two-phase approach would include adequate detail to establish whether or not sites are available, wastewater quality is suitable, and land treatment is

cost competitive. The second phase would include in-depth investigation of sites and the refinement of system design factors to complete all of the requirements for preparing a facility plan. Approval of a facility plan will ensure that the following details for evaluation of land treatment are clearly delineated in the plan.

1. Site Selection. A regional map shall be included to show the tracts of land evaluated as probable land treatment sites. The narrative discussion of site evaluation should detail the reasons for rejection of tracts as well as the availability of tracts used in the preliminary design for land treatment alternatives. Table 2-2 of the Design Manual (Attachment C) delineates general site characteristics for land treatment alternatives which the narrative should cover in detail.

Categorical elimination of land treatment for lack of a suitable site (during phase one of a two-phase evaluation) should be documented with support materials showing how the applicant made the determination. For example, elimination for lack of suitable soils should be documented with soils information from the area Soil Conservation Service representatives or other soil scientists who may be available. Any categorical elimination of land treatment should demonstrate that additional engineering necessary to overcome site constraints would make the alternative too costly to fund in accordance with the cost-effectiveness requirements of the law.

2. Loading Rates and Land Area. The values for these parameters evaluated in the facility plan should concur with the technically established ranges for application rates and land area needed for a system. The cost of land treatment is sensitive to these factors and overly conservative design unduly inflates the cost of technically sound alternatives. Designs in a facility plan should fall within the general ranges given in Table 2-1 and Figure 3-3 of the Design Manual. Designs falling outside of these ranges should do so only because of extenuating circumstances peculiar to the site. These extenuating circumstances should be discussed in detail. Table 2-1 (Attachment B) is recommended as a quick reference for determining that designs are reasonable.

3. Estimated Costs. The estimated costs of land treatment alternatives should be comparable to those obtained by using EPA 430/9-75-003 pages 59-127, updated using local construction cost indices. Cost estimates generated by using this source are being compared to actual costs for recently constructed facilities. If this comparison shows that the curves in EPA 430/9-75-003 need adjustment, corrected curves will be made available as necessary.

Elimination of land treatment in the cost-effective analysis because of land costs or transport costs should be documented by means of an actual evaluation for the cost of land or cost of

transport. This evaluation should show clearly that the cost of land or the cost of transport does rule out land treatment using the approach shown in "Cost-Effective Comparison of Land Application and Advanced Wastewater Treatment" (EPA 430/9-75-016). Examples on pages 23-24 (Attachment D) of that source show how to make these comparisons.

4. Preapplication Treatment. The level of preapplication treatment prior to storage or actual application to the land should be in accordance with the guidance given for screening wastewaters to be applied to the land in the Design Manual. A universal minimum of secondary treatment for direct surface discharge as published in the August 17, 1973 Federal Register and later modified (Federal Register July 26, 1976 and October 7, 1977) will not be accepted because it is inconsistent with the basic concepts of land treatment. Imposition of a defined discharge criteria at an intermediate point in a treatment train is, in most instances, an unnecessarily stringent preapplication treatment requirement as stated in the Administrator's memorandum dated October 3, 1977. Criteria imposed at an intermediate point should be for the purpose of ensuring overall system performance in the same context that primary sedimentation precedes biological secondary treatment by trickling filter or activated sludge processes.

Assessment of the level of preapplication treatment proposed should be in accord with the discussion in Section 5.2 (pages 5-26 to 5-30) of the Design Manual. Guidelines for evaluating the level of preapplication for slow-rate, rapid infiltration, and overland flow systems in relation to existing state regulations, criteria and guidelines are included in Attachment E. Preapplication treatment criteria more restrictive than the ranges of treatment levels described in Appendix E will be considered unnecessarily stringent unless justified on a case-by-case basis. When the more stringent preapplication treatment criteria cannot be justified, the EPA will consider that portion of the project to meet EPA guidance as eligible for Agency funding. The costs of the additional preapplication increment needed to meet more stringent preapplication treatment requirements imposed at the state or local level would be ineligible for Agency funding and thus would be paid for from state or local funds.

5. Environmental Effects. Assessing the environmental effects of land treatment alternatives involves a somewhat different concept than for conventional treatment and discharge to surface waters. The assessment for land treatment should include emphasis on the quality and quantity of both surface and groundwater resources; on energy conservation as well as energy demands; on pollutant (resource) recycling as well as chemical needs, and on land use in the overall coverage of environmental effects.

The assessment should determine that the proposed land treatment system is in accord with Agency policy on groundwater protection. The Agency policy for groundwater resulting from land treatment systems is set forth in the criteria for Best Practicable Waste Treatment Technology (BPWTT). These criteria specify that the groundwater resulting from a land treatment system must meet different requirements depending on current use and quality of the existing groundwater. The basic thrust of these criteria is to protect groundwater for drinking water purposes by specifying adherence to the appropriate National Primary Drinking Water Standards. The BPWTT criteria further require land treament systems which are underdrained or otherwise designed to have a surface discharge to meet the standards applicable to any treatment and discharge alternative. The criteria are fully described in 41 FR 6190 (February 11, 1976) which is attached as Appendix F.

An overall Agency policy statement on groundwater protection is scheduled for issuance in the near future. The draft Agency groundwater policy is generally consistent with present criteria for land treatment systems. However, any revisions to the present guidance on site evaluation and system monitoring as a result of this statement will have to be accounted for as they are developed. In the meantime, existing guidance should be used to evaluate groundwater influences.

Attachments

V. REFERENCES

Process Design Manual for Land Treatment of Municipal Wastewater EPA 625/1-77-008 October, 1977.

October 3, 1977 memorandum from Administrator:"EPA Policy on Land Treatment of Municipal Wastewater".

"Cost of Wastewater Treatment by Land Application" Technical Report EPA-430/9-75-003 June, 1975.

"Cost-Effective Comparison of Land Application and Advanced Wastewater Treatment" Technical Report EPA-430/9-75-016, November, 1975.

Secondary Treatment Information Federal Register 38(129), August 17,, 1973, pgs 22298-22299.

Secondary Treatment Information Federal Register 41(1440, July 26, 1976, pp. 30786-30789.

Suspended Solids Limitations Federal Register 42(195), October 7, 1977, pp. 54664-54666.

Water Quality Criteria 1972 EPA-R3-73-033, March 1973, pp. 323-366.

Quality Criteria for Water, USEPA, July, 1976.

Alternative Waste Management Techniques for Best Practicable Waste Treatment EPA 430/9-75-013, October, 1975.

Final Construction Grants Regulations Federal Register 39, No. 29 February 11, 1974.

VI. ATTACHMENTS

Attachment A	Administrator's Oct. 3, 1977 memo "EPA Policy on Land Treatment of Municipal Wastewater"
Attachment B	Table 2-1 from Design Manual
Attachment C	Table 2-2 from Design Manual
Attachment D	Pages 23-24 from EPA 430/9-75-016
Attachment E	Guidance for assessing level of preapplication
Attachment F	Alternative Waste Management Techniques (BPWTT)

ATTACHMENT A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 3 1977

THE ADMINISTRATOR

SUBJECT: EPA Policy on Land Treatment of Municipal Wastewater

FROM: The Administrator

TO: Assistant Administrators and
Regional Administrators (Regions I-X)

President Carter's recent Environmental Message to the Congress emphasized the design and construction of cost-effective publicly owned wastewater treatment facilities that encourage water conservation as well as adequately treat wastewater. This serves to strengthen the encouragement under the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) to consider wastewater reclamation and recycling by land treatment processes.

At the time P.L. 92-500 was enacted, it was the intent of Congress to encourage to the extent possible the development of wastewater management policies that are consistent with the fundamental ecological principle that all materials should be returned to the cycles from which they were generated. Particular attention should be given to wastewater treatment processes which renovate and reuse wastewater as well as recycle the organic matter and nutrients in a beneficial manner. Therefore, the Agency will press vigorously for publicly owned treatment works to utilize land treatment processes to reclaim and recycle municipal wastewater.

RATIONALE

Land treatment systems involve the use of plants and the soil to remove previously unwanted contaminants from wastewaters. Land treatment is capable of achieving removal levels comparable to the best available advanced wastewater treatment technologies while achieving additional benefits. The recovery and beneficial reuse of wastewater and its nutrient resources through crop production, as well as wastewater treatment and reclamation, allow land treatment systems to accomplish far more than most conventional treatment and discharge alternatives.

The application of wastewater on land is a practice that has been used for many decades; however, recycling and reclaiming wastewater that may involve the planned recovery of nutrient resources as part of a designed wastewater treatment facility is a relatively new technique. One of the first such projects was the large scale Muskegon, Michigan, land treatment demonstration project funded under the Federal Water Pollution Control Act Amendments of 1966 (P.L. 84-660), which began operations in May 1974.

Reliable wastewater treatment processes that utilize land treatment concepts to recycle resources through agriculture, silviculture and aquaculture practices are available. The technology for planning, designing, constructing and operating land treatment facilities is adequate to meet both 1983 and 1985 requirements and goals of P.L. 92-500.

Land treatment is also presently in extensive use for treatment of many industrial wastewaters, particularly those with easily degraded organics such as food processing. Adoption of suitable in-plant pretreatment for the removal of excessive metals and toxic substances would expand the potential for land treatment of industrial wastewater and further enhance the potential for utilization of municipal wastewater and sludges for agricultural purposes.

APPROACH

Because land treatment processes contribute to the reclamation and recycling requirements of P.L. 92-500, they should be preferentially considered as an alternative wastewater management technology. Such consideration is particularly critical for smaller communities. While it is recognized that acceptance is not universal, the utilization of land treatment systems has the potential for saving billions of dollars. This will benefit not only the nationwide water pollution control program, but will also provide an additional mechanism for the recovery and recycling of wastewater as a resource.

EPA currently requires each applicant for construction grant funds to make a conscientious analysis of wastewater management alternatives with the burden upon the applicant to examine all available alternative technologies. Therefore, if a method that encourages water conservation, wastewater reclamation and reuse is not recommended, the applicant should be required to provide complete justification for the rejection of land treatment.

Imposition of stringent wastewater treatment requirements prior to land application has quite often nullified the cost-effectiveness of land treatment processes in the past. We must ensure that appropriate Federal, State and local requirements and regulations are imposed at the

proper point in the treatment system and are not used in a manner that may arbitrarily block land treatment projects. Whenever States insist upon placing unnecessarily stringent preapplication treatment requirements upon land treatment, such as requiring EPA secondary effluent quality in all cases prior to application on the land, the unnecessary wastewater treatment facilities will not be funded by EPA. This should encourage the States to re-examine and revise their criteria, and so reduce the cost burden, especially to small communities, for construction and operation of unnecessary or too costly facilities. The reduction of potentially toxic metals and organics in industrial discharges to municipal systems often is critical to the success of land treatment. The development and enforcement at the local level of pretreatment standards that are consistent with national pretreatment standards should be required as an integral part of any consideration or final selection of land treatment alternatives. In addition, land treatment alternatives must be fully coordinated with on-going areawide planning under section 208 of the Act. Section 208 agencies should be involved in the review and development of land treatment options.

Research will be continued to further improve criteria for preapplication treatment and other aspects of land treatment processes. This will add to our knowledge and reduce uncertainties about health and environmental factors. I am confident, however, that land treatment of municipal wastewaters can be accomplished without adverse effects on human health if proper consideration is given to design and management of the system.

INTER-OFFICE COORDINATION

The implementation of more recent mandates from the Safe Drinking Water Act (P.L. 93-532), the Toxic Substances Control Act (P.L. 94-469), and the Resource Conservation and Recovery Act of 1976 (P.L. 94-580) must be closely coordinated with the earlier mandate to recycle wastes and fully evaluate land treatment in P.L. 92-500. Agencywide coordination is especially important to the proper management of section 201 of P.L. 92-500, because the construction and operation of thousands of POTW's involve such a broad spectrum of environmental issues. A concerted effort must be made to avoid unilateral actions, or even the appearance of unilateral actions, which satisfy a particular mandate of one Act while inadvertently conflicting with a major Agency policy based upon another Act. The intention of P.L. 92-500, as it concerns land treatment, is compatible with the pertinent aspects of more recent environmental legislation.

ACTION REQUIRED

Each of you must exert maximum effort to ensure that the actions of your staffs reflect clearly visible encouragement of wastewater reclamation and recycling of pollutants through land treatment processes in order to move toward the national goals of conserving water and eliminating the discharge of pollutants in navigable waters by 1985.

This policy will apply to all future municipal construction grant activities, as well as all current grant applications in the Step 1 category that have not been approved as of this date. Detailed information and guidance for implementation of this policy is under preparation and will be issued in the near future.

TABLE 2-1

COMPARISON OF DESIGN FEATURES FOR LAND TREATMENT PROCESSES

Feature	Principal processes			Other processes	
	Slow rate	Rapid infiltration	Overland flow	Wetlands	Subsurface
Application techniques	Sprinkler or surface[a]	Usually surface	Sprinkler or surface	Sprinkler or surface	Subsurface piping
Annual application rate, ft	2 to 20	20 to 560	10 to 70	4 to 100	8 to 87
Field area required, acres[b]	56 to 560	2 to 56	16 to 110	11 to 280	13 to 140
Typical weekly application rate, in.	0.5 to 4	4 to 120	2.5 to 6[c] 6 to 16[d]	1 to 25	2 to 20
Minimum preapplication treatment provided in United States	Primary sedimentation[e]	Primary sedimentation	Screening and grit removal	Primary sedimentation	Primary sedimentation
Disposition of applied wastewater	Evapotranspiration and percolation	Mainly percolation	Surface runoff and evapotranspiration with some percolation	Evapotranspiration, percolation, and runoff	Percolation with some evapotranspiration
Need for vegetation	Required	Optional	Required	Required	Optional

a. Includes ridge-and-furrow and border strip.

b. Field area in acres not including buffer area, roads, or ditches for 1 Mgal/d (43.8 l/s) flow.

c. Range for application of screened wastewater.

d. Range for application of lagoon and secondary effluent.

e. Depends on the use of the effluent and the type of crop.

1 in. = 2.54 cm
1 ft = 0.305 m
1 acre = 0.405 ha

ATTACHMENT B

TABLE 2-2

COMPARISON OF SITE CHARACTERISTICS FOR LAND TREATMENT PROCESSES

	Principal processes			Other processes	
Characteristics	Slow rate	Rapid infiltration	Overland flow	Wetlands	Subsurface
Slope	Less than 20% on cultivated land; less than 40% on noncultivated land	Not critical; excessive slopes require much earthwork	Finish slopes 2 to 8%	Usually less than 5%	Not critical
Soil permeability	Moderately slow to moderately rapid	Rapid (sands, loamy sands)	Slow (clays, silts, and soils with impermeable barriers)	Slow to moderate	Slow to rapid
Depth to groundwater	2 to 3 ft (minimum)	10 ft (lesser depths are acceptable where underdrainage is provided)	Not critical	Not critical	Not critical
Climatic restrictions	Storage often needed for cold weather and precipitation	None (possibly modify operation in cold weather)	Storage often needed for cold weather	Storage may be needed for cold weather	None

1 ft = 0.305 m

ATTACHMENT C

Example No. 2

Requirements. An existing 20-mgd activated sludge plant is required to upgrade its effluent quality to meet the following criteria:

BOD - 10 mg/l

SS - 10 mg/l

N - 3 mg/l

P - 0.5 mg/l

Alternatives. It is evident from a review of Table 2 that the only methods of treatment capable of providing the necessary degree of treatment are AWT-4 and irrigation. In this example, the cost of AWT-4 is compared with that of irrigation under varying conditions of conveyance distance (Case A) and land costs (Case B). Since secondary treatment is existing, activated sludge or aerated lagoon will not be necessary.

Case A - Consider a moderately favorable site for irrigation, a distance of 5 miles away from the existing treatment plant site. How much can be paid for land and have the irrigation system competitive with the AWT-4 system?

Table 12. COST COMPARISON FOR CASE A

Treatment method	Cost component	Cost ¢/1,000 gal.	Source
AWT-4	AWT-4	44.0	Figure 1
	Existing activated sludge adjustment	-(16.0)	Figure 1
	Total	28.0	
Irrigation	Irrigation system	24.0	Figure 1
	Aerated lagoon adjustment	-(4.3)	Figure 1
	Land cost	-(6.7)	Table 7
	Subtotal	13.0	
	Amount available for land = (28.0-13.0)	15.0	
	Total area, acres	4,300	Table 7
	Allowable cost/acre $= \frac{20 \text{ mgd } (15¢/1{,}000 \text{ gal.})(10^3)}{(0.0154)(4{,}300 \text{ acres})}$	4,500	

Conclusions. Under the assumed site conditions for the irrigation system, as much as $4,500 per acre could be paid for land and have the irrigation system competitive with AWT-4.

Case B - Consider a moderately favorable irrigation site at a cost of $2,000 per acre. How far away from the existing treatment plant could the site be and have the irrigation system competitive with AWT-4?

Table 13. COST COMPARISON FOR CASE B

Treatment method	Cost component	Cost ¢/1,000 gal.	Source
AWT-4	From Case A	28.0	Figure 1
Irrigation	Irrigation system	24.0	Figure 1
	Aerated lagoon adjustment	-(4.3)	Figure 1
	Conveyance cost	-(1.7)	Table 7
	Subtotal	18.0	
	Amount available for conveyance = (28.0 - 18.0)	10.0	--
	Allowable distance, miles	33	Table 4

Conclusions. Under the assumed site conditions for the irrigation system, wastewater could be conveyed as far as 33 miles and have irrigation be competitive with AWT-4. Special conditions such as river or highway crossings and easements may add substantial costs and reduce this distanc somewhat.

ATTACHMENT E

Guidance for Assessing Level of Preapplication Treatment

I. Slow-rate Systems (reference sources include Water Quality Criteria 1972, EPA-R3-73-003, Water Quality Criteria EPA 1976, and various state guidelines).

A. Primary treatment - acceptable for isolated locations with restricted public access and when limited to crops not for direct human consumption.

B. Biological treatment by lagoons or inplant processes plus control of fecal coliform count to less than 1,000 MPN/100 ml acceptable for controlled agricultural irrigation except for human food crops to be eaten raw.

C. Biological treatment by lagoons or inplant processes with additional BOD or SS control as needed for aesthetics plus disinfection to log mean of 200/100 ml (EPA fecal coliform criteria for bathing waters) - acceptable for application in public access areas such as parks and golf courses.

II. Rapid-infiltration Systems

A. Primary treatment - acceptable for isolated locations with restricted public access.

B. Biological treatment by lagoons or inplant processes - acceptable for urban locations with controlled public access.

III. Overland-flow Systems

A. Screening or comminution - acceptable for isolated sites with no public access.

B. Screening or comminution plus aeration to control odors during storage or application - acceptable for urban locations with no public access.

ENVIRONMENTAL PROTECTION AGENCY

[FRL 482-6]

ALTERNATIVE WASTE MANAGEMENT TECHNIQUES FOR BEST PRACTICABLE WASTE TREATMENT

Supplement

Pursuant to Section 304(d)(2) of the Federal Water Pollution Control Act Amendments of 1972 (Pub. L. 92-500), the Environmental Protection Agency (EPA), gave notice on October 23, 1975 (40 FR 49598) that Alternative Waste Management Techniques for Best Practicable Waste Treatment has been published in final form. The final report contains the criteria for best practicable waste treatment technology and information on alternative waste management techniques.

The criteria for Best Practicable Waste Treatment for Alternatives employing land application techniques and land utilization practices required that the ground water resulting from land application of wastewater meet the standards for chemical quality [inorganic chemicals] and pesticides [organic chemicals] specified in the EPA Manual for Evaluating Public Drinking Water Supplies in the case of groundwater which potentially can be used for drinking water supply. In addition to the standards for chemical quality and pesticides, the bacteriological standards [microbiological contaminants] specified in the EPA Manual for Evaluating Drinking Water Supplies were required in the case of groundwater which is presently being used as a drinking water supply. The pertinent section of the EPA Manual for Evaluating Public Drinking Water Supplies was included as Appendix D of the Alternative Waste Management Techniques for Best Practicable Waste Treatment report.

Also specified in the Criteria for Best Practicable Waste Treatment is that "any chemical, pesticides, or bacteriological standards for drinking water supply sources hereafter issued by EPA shall automatically apply in lieu of the standards in the EPA Manual for Evaluating Public Drinking Water Supplies. The National Interim Primary Drinking Water Regulations were published in final form on December 24, 1975.

In consideration of the foregoing, Chapter II and Appendix D of Alternative Waste Management Techniques for Best Practicable Waste Treatment shall read as follows.

Dated: February 4, 1976.

RUSSELL E. TRAIN,
Administrator.

CHAPTER II

CRITERIA FOR BEST PRACTICABLE WASTE TREATMENT

Applicants for construction grant funds authorized by Section 201 of the Act must have evaluated alternative waste treatment management techniques and selected the technique which will provide for the application of best practicable waste treatment technology. Alternatives must be considered in three broad broad categories: treatment and discharge into navigable waters, land application and utilization practices, and reuse of treated wastewater. An alternative is "best practicable" if it is determined to be cost-effective in accordance with the procedures set forth in 40 CFR Part 35 (Appendix B to this document) and if it will meet the criteria set forth below.

(A) Alternatives Employing Treatment and Discharge into Navigable Waters. Publicly-owned treatment works employing treatment and discharge into navigable waters shall, as a minimum, achieve the degree of treatment attainable by the application of secondary treatment as defined in 40 CFR 133 (Appendix C). Requirements for additional treatment, or alternate management techniques, will depend on several factors, including availability of cost-effective technology, cost and the specific characteristics of the affected receiving water body.

(B) Alternatives Employing Land Application Techniques and Land Utilization Practices. Publicly-owned treatment works employing land application techniques and land utilization practices which result in a discharge to navigable waters shall meet the criteria for treatment and discharge under Paragraph (A) above.

The ground water resulting from the land application of wastewater, including the affected native ground water, shall meet the following criteria:

Case I: The ground water can potentially be used for drinking water supply.

(1) The maximum contaminant levels for inorganic chemicals and organic chemicals specified in the National Interim Primary Drinking Water Regulations (40 CFR 141) (Appendix D) for drinking water supply systems should not be exceeded except as indicated below (see Note 1).

(2) If the existing concentration of a parameter exceeds the maximum contaminant levels for inorganic chemicals or organic chemicals, there should not be an increase in the concentration of that parameter due to land application of wastewater.

Case II: The ground water is used for drinking water supply.

(1) The criteria for Case I should be met.

(2) The maximum microbiological contaminant levels for drinking water supply systems specified in the National Interim Primary Drinking Water Regulations (40 CFR 141) (Appendix D) should not be exceeded in cases where the ground water is used without disinfection (see Note 1).

Case III: Uses other than drinking water supply.

(1) Ground water criteria should be established by the Regional Administrator based on the present or potential use of the ground water.

The Regional Administrator in conjunction with the appropriate State officials and the grantee shall determine on a site-by-site basis the areas in the vicinity of a specific land application site where the criteria in Case I, II, and III shall apply. Specifically determined shall be the monitoring requirements appropriate for the project site. This determination shall be made with the objective of protecting the ground water for use as a drinking water supply and/or other designated uses as appropriate and preventing irrevocable damage to ground water. Requirements shall include provisions for monitoring the effect on the native ground water.

(C) Alternatives Employing Reuse. The total quantity of any pollutant in the effluent from a reuse project which is directly attributable to the effluent from a publicly-owned treatment works shall not exceed that which would have been allowed under Paragraphs (A) and (B) above.

NOTE 1.—Any amendments of the National Interim Primary Drinking Water Regulations and any National Revised Primary Drinking Water Regulations hereafter issued by EPA prescribing standards for public water system relating to inorganic chemicals, organic chemicals or microbiological contamination shall automatically apply in the same manner as the National Interim Primary Drinking Water Regulations.

APPENDIX D

GROUND WATER REQUIREMENTS

The following maximum contaminant levels contained in the National Interim Primary Drinking Water Regulations (40 CFR 141) are reprinted for convenience and clarity. The National Interim Primary Drinking Water Regulations were published in final form in the FEDERAL REGISTER on December 24, 1975. In accordance with the criteria for best practicable waste treatment, 40 CFR 141 should be consulted in its entirety when applying the standards contained therein to wastewater treatment systems employing land appplication techniques and land utilization practices.

Maximum contaminant levels for inorganic chemicals. The following are the maximum levels of inorganic chemicals other than fluoride:

Contaminant:	Level (milligrams per liter)
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

The maximum contaminant levels for fluoride are:

Temperature degrees Fahrenheit [1]	Degrees Celsius	Level (milligrams per liter)
53.7 and below	12 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

[1] Annual average of the maximum daily air temperature.

Maximum contaminant levels for organic chemicals. The following are the maximum contaminant levels for organic chemicals:

	Level (milligram per liter)
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-Hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl] ethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$ - Technical chlorinated camphene, 67 to 69 percent chlorine)	0.005
(b) Chlorophenoxys:	
2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

Maximum microbiological contaminant levels. The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(a) When the membrane filter technique pursuant to § 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:

(1) One per 100 milliliters as the arithmetic mean of all samples examined per month pursuant to § 141.21 (b) or (c);

(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.

(b) (1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) More than 10 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) Three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) Three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) More than 60 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) Five portions in more than one sample when less than five samples are examined per month; or

(iii) Five portions in more than 20 percent of the samples when five or more samples are examined per month.

(c) For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with Paragraphs (a), (b) (1), or (2) shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one-month period.

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