

5599

REGION V GUIDANCE

SITE SPECIFIC NEED
DETERMINATION AND ALTERNATIVE PLANNING
FOR UNSEWERED AREAS. JUN 26 PM 3.33

I. Objective

The objective of this guidance is to clarify fulfillment of the requirements regarding the demonstration of need for sewage treatment associated with the application of Program Requirements Memorandum (PRM) 78-9, "Funding of Sewage Collection System Projects," and PRM 79-8, "Small Wastewater Systems." This guidance is written particularly with respect to the needs of small, rural communities and the consideration of individual on-site and small scale technologies. It suggests procedures which may be utilized to minimize the time, effort, and expense necessary to demonstrate facilities needs. It is also intended to provide guidance pertaining to the selection of decentralization alternatives for a cost-effectiveness comparison. It is intended to prevent indiscriminate definition of need based upon "broad brush" use of a single criterion or on decisions unsupported by fact.

The procedure recommended herein may not be the optimum procedure for all projects. However, compliance with this approach will be prima facie evidence for the acceptability of the "needs" portion of a proposed plan of study. If another method is proposed for documenting needs for wastewater facilities, it is recommended that the grant applicant discuss the proposed approach with reviewing authorities prior to the submission of the Plan of Study and the Step 1 grant application.

This guidance is predicated on the premise that planning expenditures should be commensurate with the cost and risk of implementing feasible alternatives for a specific planning area. The guidance further recognizes the complexity of planning alternative technology. It presents procedures for, and rationally limits, the amount of detailed site investigation necessary to determine the suitability of alternative technology for specific areas within the community, and allows for a degree of risk inherent to limited data gathering.

II. Goal

The goal of this process is to enable communities to categorize existing on-site treatment systems into three groups. The groups are those experiencing: (a) obvious sewage treatment problems, (b) no problem, and (c) potential problems representing a planning risk that requires resolution by the acquisition of original data.

The acquisition of original data as described will support not only documentation of need but also development of appropriate alternatives and their associated costs.

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III. Criteria for site-specific needs determination

A. Direct evidence that demonstrates obvious problems includes:

1. Failure by surface (breakout) ponding of filter field discharges can be identified through direct observations, mailed questionnaires, and remote imagery.
2. Sewage backup in residences can be identified through responses to mailed questionnaires, knowledge of local septage haulers, or knowledge of local health or zoning officials.
3. Flowing effluent pipes detected by aerial photography, site visits, knowledge of local officials, or results of mailed questionnaires.
4. Contamination of water supply wells (groundwater) by sewage can be demonstrated by well inspection and sampling and analyses for whiteners, chlorides, nitrates, fecal coliform bacteria, or other indicators, and a finding of their presence in concentrations which significantly exceed background levels in groundwaters of the area or primary drinking water quality standards. Improperly constructed wells or wells inadequately protected from surface runoff cannot be used to demonstrate an obvious need. Wells for which construction and protection are unknown cannot be used to demonstrate an obvious need.
5. Samples taken from effluents entering surface water through soil that analysis shows to have unacceptable quantities of nutrients or bacteria.

B. Indirect evidence that indicates potential problems due to site limitations or inadequate design of treatment systems includes:

1. Seasonal or year-round high water table. Seasonal or annual water table can be determined by taking transit sightings from a known lake level, if the dwelling in question is adjacent to a lake or other surface waters. Elsewhere, Soil Conservation Service maps may indicate depth to groundwater.
2. Water well isolation distances (depending on depth of well and presence or absence of impermeable soils). Isolation distances may be addressed in part by lot size. In cases where a community water system is installed or is concurrently planned, this criterion will not be considered. Lots, including consolidated lots, which are less than 10,000 square feet in area, will be assumed to have insufficient isolation distances. However, before this criterion may be used as areawide evidence, a correlation with results of limited representative sampling which substantiate water well contamination must be made.
3. Documented groundwater flow from a filter field toward a water supply well may override seemingly adequate separation distances.

4. Sewage effluent or tracer dye in surface water detected by site visit or various effluent detection systems. Additional tests that indicate unacceptable quantities of nutrients or bacteria in the effluent reaching surface water will establish direct evidence of need.
5. Bedrock proximity (within three feet of filter field pipe) can be assessed by utilizing existing SCS soils maps.
6. Slowly permeable soils with greater than 60 minutes/inch percolation rate.
7. Rapidly permeable soil with less than 0.1 minutes/inch percolation rate. Soil permeability may be assessed by evaluating existing SCS maps.
8. While holding tanks, in certain cases, can be a cost-effective alternative, for purposes of site-specific needs determination, a residence equipped with a holding tank for domestic sewage should be considered as indirect evidence of need for sewage treatment facilities. Location of holding tanks will be identified through records of local permitting officials, septage haulers, or results of mailed questionnaires.
9. On-site treatment systems which do not conform to accepted practices or current sanitary codes may be documented by owners, installers, or local permitting officials. This category would include cesspools, inadequately sized system components (the proverbial "55 gallon drum" septic tank), and systems which feature direct discharge of septic tank effluent to surface water.
10. On-site systems: (a) incorporating components, (b) installed on individual lots, or (c) of an age, that local data indicate are characterized by excessive defect and failure rates, or non-cost-effective maintenance requirements.

Indirect evidence may not be used alone to document the need for either centralized or decentralized facilities. Prior to field investigation, indirect evidence should be used to define the scope and level of effort of the investigations. When the investigations are finalized, indirect evidence and results of the field work can be used together to predict the type and number of on-site and small scale facilities needed in the community. Facilities predictions form the basis for alternatives development in Step 1 facilities planning.

IV. Needs determination for unsewered communities

For projects in which the scope of work is difficult to assess during the Step 1 application, it is recommended that Step 1 be divided into two phases to more effectively allow estimation of the planning scope and associated costs. Phase I will consist of a review of existing or easily obtainable data. Phase II will include on-site investigations and representative sam-

pling necessary to adequately define water quality and public health problems, identify causes of the problems and predict measures that remedy the problems. Phase II will also include development of alternatives and completion of the facilities plans. Both phases should be addressed in the Plan of Study and grant application. The phases are discussed in greater detail below.

A. Phase I

The review of existing or easily obtainable data may include the following as appropriate:

1. Review of local well and septic tank permit records. Repair permits for septic tank systems can provide valuable data on rates and causes of system failures as well as information on the repairability of local systems.
2. Interviews with health department or other officials responsible for existing systems, with septic tank installers and haulers, and with well drillers.
3. Review of soils maps
4. Calculation of lot sizes
5. Estimate depth to water table by reference to lake levels or from information in soil maps.
6. Aerial photography interpreted to identify suspected surface malfunctions
7. Leachate detection surveys of ground or surface water
8. A mailed questionnaire regarding each owner's or resident's knowledge of the on-site system and its performance. Mailed questionnaires will generate useful data only if well prepared. Generally, mailed questionnaires should be used only where available information indicate very low problem rates (to support No Action alternatives) or where the data indicate very high problem rates (to support central collection and treatment alternatives).

This preliminary data will be used to categorize developed lots within the planning area into one of three groups:

1. Obvious-problem
2. No-problem
3. Inconclusive

The "obvious-problem" group consists of those lots where at least one criterion of direct evidence of a need (specified on Page 2 of this guidance) is satisfied.

The "no-problem" group consists of those lots where there is no direct or indirect evidence to indicate that the present system is inadequate or malfunctioning.

The "inconclusive" group consist of developed lots with indirect evidence of problems. The size of this group and the types of indirect evidence associated with it will dictate the scope and level of effort of field investigations conducted during Phase II.

Typically field work in Phase I will be limited to rapid, community-wide surveys which require little or no entry onto private property. Examples are acquisition and interpretation of aerial photography, field checking of aerial photography interpretations, and shoreline effluent scans. Additionally, a windshield survey of the community in the company of health department officials, soil scientists or other locally knowledgeable persons will help the applicants' representative or consultant develop a strategy and cost estimate for Phase II field investigations.

To facilitate communication of Phase I information, preparation of a planning area base map at a scale sufficient to locate individual buildings will normally be helpful. U.S. Geological survey 7.5 minute maps (1:24,000) Soil Conservation Service soil maps (1:15,840) or local tax maps can be used to inexpensively prepare base maps. At the end of Phase I, base maps can be used to show developed areas obviously requiring centralized facilities, individual buildings with obvious problems and developed areas with indirect evidence of problems.

Phase I as used here applies principally to needs documentation activities. Obviously, other facilities planning tasks can proceed concurrently with Phase I.

B. Mid-Course Review

At the end of Phase I, the results of the Phase I effort should be presented for review and concurrence before proceeding to Phase II. The Mid-Course Meeting facilities plan review is an appropriate time for the presentation and discussion of the Phase I results.

The following should be considered at the Mid-Course Meeting:

1. It may become apparent during Phase I that on-site, alternative technology systems will not be cost-effective for segments of the community that have obvious needs. In this case, a preliminary cost estimate for conventional collection and treatment should be compared to that for the innovative/alternative treatment solution. If cost estimates and technical analysis indicate that the use of alternative technology is clearly not cost-effective, needs documentation may be terminated for these segments without proceeding to the on-site investigations of Phase II.
2. The number of lots to be investigated during the on-site evaluation should be reasonably estimated. If the original estimation of on-site work included in the Step 1 Grant Agreement is found to be in error at the end of the preliminary evaluation (Phase I), a request to amend the grant amount, if necessary, may be

submitted and a grant amendment expeditiously processed provided there is concurrence at the Mid-Course Meeting.

C. Phase II Work

Field investigations in Phase II have two primary purposes:

- reclassification of buildings from the "inconclusive" category to "obvious problem", "no problem" or "potential problem" categories (defined below)
- development of information needed to predict the technologies and their costs for responding to the community's waste water problems.

Field investigations can also be designed to accomplish other objectives such as public participation, socio-economic data collection, etc.

During Phase II previously unrecognized but documentable water quality and public health problems may be identified, increasing the number of "obvious problem" buildings. The remainder of buildings investigated will be classified in the two remaining categories. In order to do this, representative sampling of site conditions and water quality in conjunction with partial sanitary surveys may be conducted. Both "obvious" and "inconclusive" problem buildings should be included in the partial sanitary survey so that reasonable correlations between site conditions, system usage and system failures in the community can be made.

"Potential problems" are systems which do not yet exhibit direct evidence of failure but which can reasonably be expected to fail in the future. Justifying this expectation must rely on analysis of the causes for failure of substantially similar systems in the community. Similarity will be judged on information for system usage (number of occupants and types of sanitary appliances), system design and age, and verified site limitations (permeability, depth to groundwater or bedrock, slope, surface drainage, etc.). Buildings in the "inclusive" category whose systems are not similar to any documented failing system will be included in the "No Problem" category.

This work should be proposed and conducted with the knowledge that adoption of decentralized alternatives will necessitate complete site analysis for each building later in the Construction Grants process. Work should, therefore, be thorough enough that augmentation of the Phase II work by later studies can be accomplished without duplicating the Phase II work. The work should also seek the causes of problem, not just their existence, so that typical on-site and small scale technologies can be tentatively identified and incorporated into community alternatives.

Representative sampling of site conditions and water quality should be carefully coordinated with partial sanitary surveys. While the design of this work will obviously have to be tailored to each community's unique situation, general guidance is provided here.

1. Representative Sampling

- a. Seasonal or permanent high water table. Soil surveys and comparison with known lake levels reviewed in Phase I may not be accurate enough to explain specific on-site system problems or to carefully delineate groups of lots where high water table is a serious site limitation. Soil to a depth of 5 or 6 feet on or adjacent to suspect lots can resolve such uncertainties. Where seasonal high water table is suspected and work has to be conducted during dry weather, a soil scientist with knowledge of local soils should be involved.
- b. Groundwater Flow. The safety of on-site well water supplies and springs on small lots may depend on the rate and direction of groundwater flow. Estimating the effects of effluents on surface waters may also require such information. Methods which indicate groundwater flow characteristics should be selected and supervised by qualified professionals. Generally this work in Phase II will be limited to evaluation of well logs and other available data and of rapid surveys in special areas such as lakeshores. Exceptions for more intensive work will be considered where uncertainties about sources of well contamination need to be resolved for specific lots or groups of lots.
- c. Well water contamination. Where lot sizes are small or soils are especially permeable, collection and analysis of well water samples at residences included in sanitary surveys should be considered. Parameters that can be evaluated as pollution indicators include, but are not limited to: chlorides, nitrates, phosphates, fecal coliforms, surfactants, whiteners and other readily detectable constituents inherent to domestic waste water. No well samples should be collected from wells that are improperly protected from surface runoff or other non-wastewater sources. An inspection report should accompany each well analysis.
- d. Shallow groundwater contamination. In areas with drainfield to groundwater separation distances less than state standards, shallow groundwater at or near affected water bodies (lake, stream, unconfined aquifers) should be sampled before abandoning on-site wastewater systems on the basis of high water tables. Discrete samples may be collected during checks of high water tables for analysis of conventional parameters as listed above. Alternatively, as rapid survey techniques are perfected, they may be more appropriate.
- e. Soil permeability. If very slow or very rapid soil permeability is suspected of contributing to surface malfunctions, backups or groundwater contamination, soil characteristics can be evaluated by augering to 5 or 6 foot depth on or adjacent to selected lots. Usually, descriptions of soil horizons by depth, color, texture and presence of mottling,

water or bedrock will suffice. Percolation tests for existing systems will be necessary only in extraordinary circumstances.

2. Partial Sanitary Surveys

It is not the intent of needs documentation to finally identify each and every wastewater problem in a community. It is not cost-effective to select appropriate technologies for each property in Step 1.

Therefore, Phase II sanitary surveys will include only a sufficient number of existing buildings to confirm the level and type of need present, and to predict the type and approximate number of measures to correct the problems. Correlation of partial sanitary survey data, representative sampling, and indirect evidence of system problems should be sufficient to meet these objectives.

Sanitary surveys should include for each building:

- an interview with the resident to determine age of the building and sewage disposal system, design and location of the sewage disposal system, system maintenance, occupancy of the building, water using appliances, use of water conservation devices, and problems with the wastewater system.
- an inspection of the property, preferably in the company of the resident, noting location of well, septic tank, soil absorption system, pit privies and other sanitary facilities; lot dimensions; slope; roof and surface drainage; evidence of past and present malfunctions; and other relevant information such as a algae growth in shoreline areas.
- any representative sampling that is appropriate to the site and that can be scheduled concurrently.
- preliminary conclusions on maintenance, repairs, applicable water conservation methods, and types and location of replacement or upgrading for existing wastewater systems.

As a rule of thumb, the number of buildings surveyed should not exceed 30 percent. Where Phase I data is very incomplete, the buildings may be selected on a random basis and should include a minimum of 20 percent of existing buildings. Where buildings with obvious problems and areas with indirect evidence of problems are well delineated in Phase I, the surveys can be better focused, perhaps requiring fewer buildings to be surveyed. From 10 to 50 percent of buildings having obvious problems should be surveyed. In areas with indirect evidence of problems, 20 to 30 percent would be sufficient. Areas with neither direct nor indirect evidence may be surveyed where system age, unusual occupancy patterns or especially severe consequences of system failure so indicate.

V. Planning of Alternatives

In unsewered, low housing density areas, PRM 78-9, "Funding of Sewage Collection System Projects", puts the burden of proof for need and cost-effectiveness of sewers on the applicant. The four criteria outlined in PRM 78-9 for eligibility of collector sewers are:

- need
- cost-effectiveness
- substantial human habitation in 1972
- 2/3 rule

Figure 1 portrays the relationship of these criteria in a decision flow diagram.

Definition of need by the approach outlined above will address the first criterion. Estimating cost-effectiveness will typically require two steps: determining the feasibility of non-sewered technologies for remedying obvious and potential problems, and comparing the present worth of feasible non-sewered technologies with the present worth of sewers.

The determination of feasibility for non-sewered technologies should not be limited to standard septic tank/soil absorption systems. Where lot sites, site limitations or excessive flows can be overcome by alternative technologies, these must be considered. To the extent that the needs documentation results show that existing soil absorption systems smaller than current code requirements can operate satisfactorily, sub-code replacements for obvious problems should also be considered if lot site or other restrictions preclude full sized systems.

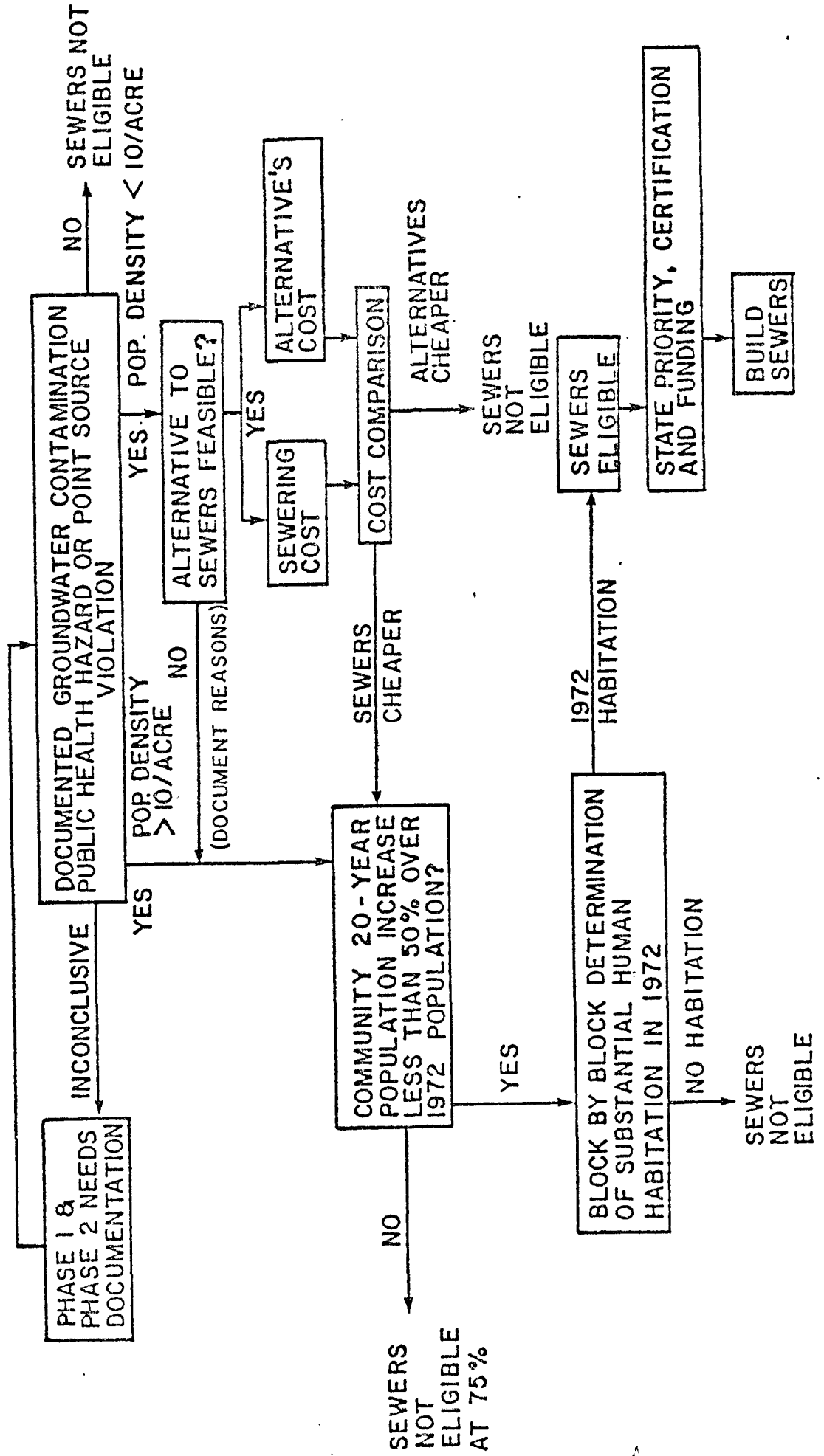
The use of needs documentation results in developing alternatives should be guided by methods selected to design the Phase II field investigations. If sanitary surveys and representative sampling were conducted on a random basis, then the types and numbers of technical remedies should be projected for the entire area surveyed without bias. However, if efforts were focused on identified problem or inconclusive segments of a community, then predictions from the data should be made for surveyed segments only. Real but unrecognized problems in "no problem" areas can be accounted for by assuming upgrading or replacement of existing systems in these areas at frequencies reasonably lower than surveyed segments.

Infeasibility of remedying individual, obvious problems on-site will not be sufficient justification for proposing central sewerage of a community or segment of a community. Off-site treatment can be achieved by pumping and hauling and by small scale, neighborhood collection and treatment systems. The choice between these approaches should be based upon a cost comparison which includes serious flow reduction measures in conjunction with any holding tanks.

Segment by segment cost-effectiveness comparisons will be required only for those segments where new facilities for off-site treatment are proposed. Community-wide cost estimates for upgrading or replacement of on-site systems in decentralized areas will generally be adequate for description of Proposed Actions pending detailed site analysis and cost estimates for each building in Step 2.

FIGURE 1

COLLECTOR SEWER ELIGIBILITY- DECISION FLOW DIAGRAM BASED ON PRM 78-9



Field work necessary to thoroughly evaluate the condition of individual on-site systems and to select technology for necessary upgrading or replacement is generally to be viewed as Step 2 or Step 2 + 3 work. Typical field work for this level of analysis includes completion of the sanitary survey and, as appropriate to each building, installation and monitoring of water meters, inspection of septic tanks, rodding house sewers and effluent lines, probing or limited excavation of soil absorption systems for inspection, and other measures listed above for representative sampling. Construction of on-site replacements and upgrading may proceed in tandem with this site specific analysis provided:

- state and local officials concur (their prior concurrence might be limited to standard systems),
- contract language allows for flexibility in the facilities to be constructed,
- property owner concurrence with the selected alterations is obtained, and
- additional cost-effectiveness analysis to support technology selection is not necessary.

Necessary state and local agency approval of off-site, non-standard, or owner-protested facilities or those requiring additional cost analysis would optimally proceed on a segment-by-segment basis to minimize the time between technology selection and construction.

The establishment of a management district's authority to accept responsibility for the proper installation, operation and maintenance of individual systems per 40 CFR 35.918-1(e) and (i) should be completed before award of Step 2 or Step 2 + 3 grants. Development of a management district's program for regulation and inspection of systems must be completed before a Step 3 grant award or before authorization to proceed with construction procurement is granted under a Step 2 + 3 grant.

VI. Public participation

The following comments are intended to demonstrate how this guidance relates to the standard requirements for public participation. It is not all inclusive.

- A. Although mailed questionnaires have limited utility for needs documentation, they can serve as useful public participation tools. A useful "mailing list" may include all owners of residences within unsewered areas in the planning area and other interested and affected parties.

The requirement for consulting with the public set forth in 40 CFR 35.917-5(b)(5) will be considered satisfied if questionnaires are submitted by individuals on the "mailing list."

- B. The public meeting required by 40 CFR 35.917-5(b)(6) provides an opportunity for property owners to be informed of whether or not they have been found to need wastewater treatment facilities. During the meeting they can respond to the consultant's determination of their need status. A map with each lot designated as no-need, obvious-problem, or inconclusive would be helpful for public understanding. This meeting could be conveniently scheduled at the end of Phase I.
- C. Partial sanitary surveys conducted during Phase 2 of needs documentation offer an excellent opportunity to gain public input provided surveyors are adequately informed about the project or can refer difficult questions to a knowledgeable person for immediate response.
- D. The final public hearing required by 40 CFR 35.917-5 should be scheduled at the end of facilities planning. At this public hearing a map showing service areas for grantee supervised decentralized technologies will be displayed. Within service areas, tentatively proposed methods of treatment and disposal for individual developed lots will be available to the lot owners. It should be made clear to the public that site investigations conducted in Steps 2 or 3 may result in adjustments to the proposed treatment and disposal methods for individual lots.

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