

Environmental Protection Agency Office of Drinking Water



Feasibility Study and System Design for the Underground Injection Control Program

June 26, 1978

Arthur Young & Company

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Mr. Frederick T. Martin, Project Officer
Office of Drinking Water
Environmental Protection Agency
Waterside Mall
401 M Street, SW
Washington, D.C. 20760

Reference: Contract No. 68-01-4640
Directive of Work 4640-7

Subject : Final Report

Dear Mr. Martin:

Arthur Young & Company is pleased to submit, in final form, our Feasibility Study Report for the Underground Injection Control Information System. This report includes definition of the information requirements of the Office of Drinking Water, the Regions and the States, a presentation of alternative concepts, and a discussion of the recommended approach. Comments received from the working group have been incorporated as appropriate.

Should you have any questions regarding the report, please contact Dr. Donald Fitzpatrick or me at (202) 785-4747.

Very truly yours,

ARTHUR YOUNG & COMPANY

By: C. E. Mendenhall
for: Gerald Mendenhall
Partner

Enclosure

cc: Mr. Edward Franklin,
MIDSD Project Officer

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I. MANAGEMENT SUMMARY

I. MANAGEMENT SUMMARY

The Environmental Protection Agency (EPA) is responsible for the Underground Injection Control (UIC) Program as defined in Subtitle C of the Safe Drinking Water Act of 1974. This program is intended to protect underground sources of water, groundwater, from the subsurface emplacement of fluids by industry. The Office of Drinking Water (ODW) of EPA is currently in the process of finalizing regulations for implementation of the UIC Program. These regulations will establish minimum requirements for effective State programs to prevent underground injection practices which endanger underground sources of drinking water. Included in these regulations will be the definition of the roles of EPA Headquarters and Regions, the States, other Federal agencies, and industry.

The Office of Drinking Water recognized early in the regulatory process that automated systems would probably be required to effectively handle the data management aspect of the program. This feasibility study was initiated to ensure that operational data management systems would be available for both States and Regions to assist them in the implementation of the regulations. The specific objectives of the study are as follows:

- . Recommend a system concept which incorporates the requirements of each of the major participants in the Underground Injection Control Program; EPA Headquarters, the EPA Regional Offices, and the States administering the program
- . Define an implementation strategy which accommodates both the immediate needs for implementation of the program and the longer range requirements for program management and enforcement activities
- . Assess the impact of the developing regulations on the costs and operations of the Underground Injection Control Information System
- . Establish the cost/effectiveness of recommended system concepts and implementation strategies
- . Provide a firm foundation for the development of general and detailed designs for the recommended system concept.

The specific purpose of the Underground Injection Control Information System is to provide a capability for the operational management of the program in the administering authority, either the authorized State or the EPA Region. However, this system definition also includes interfaces to a Federal Reporting System which would support the EPA Regions and EPA Headquarters in their program monitoring role.

The achievement of the objectives of this study depends on the ability to provide structure to a system in the context of the development of regulations for the Underground Injection Control Program. This is the case in any new program area. To assist in the definition of the system objectives, and to ensure that the specific needs of the Regions and States were considered, their active participation was solicited through their representatives in a UIC Information System Working Group. Although there continue to be many unresolved areas in the regulations which will have an impact on detailed design of the Underground Injection Control System, we believe that EPA's significant efforts in the regulatory process and participation of the Working Group has resulted in sufficient definition to continue toward the general design of a UIC Information System.

In the following sections of this Management Summary, we present our analysis of the requirements of various participants in the Underground Injection Control Program, a summary of current issues and evaluation criteria, alternative system concepts and implementation strategies for the system, a cost/effectiveness analysis for each of these alternatives and, finally, recommendations for an Underground Injection Control Information System. These topics are treated in more detail in the body of the report.

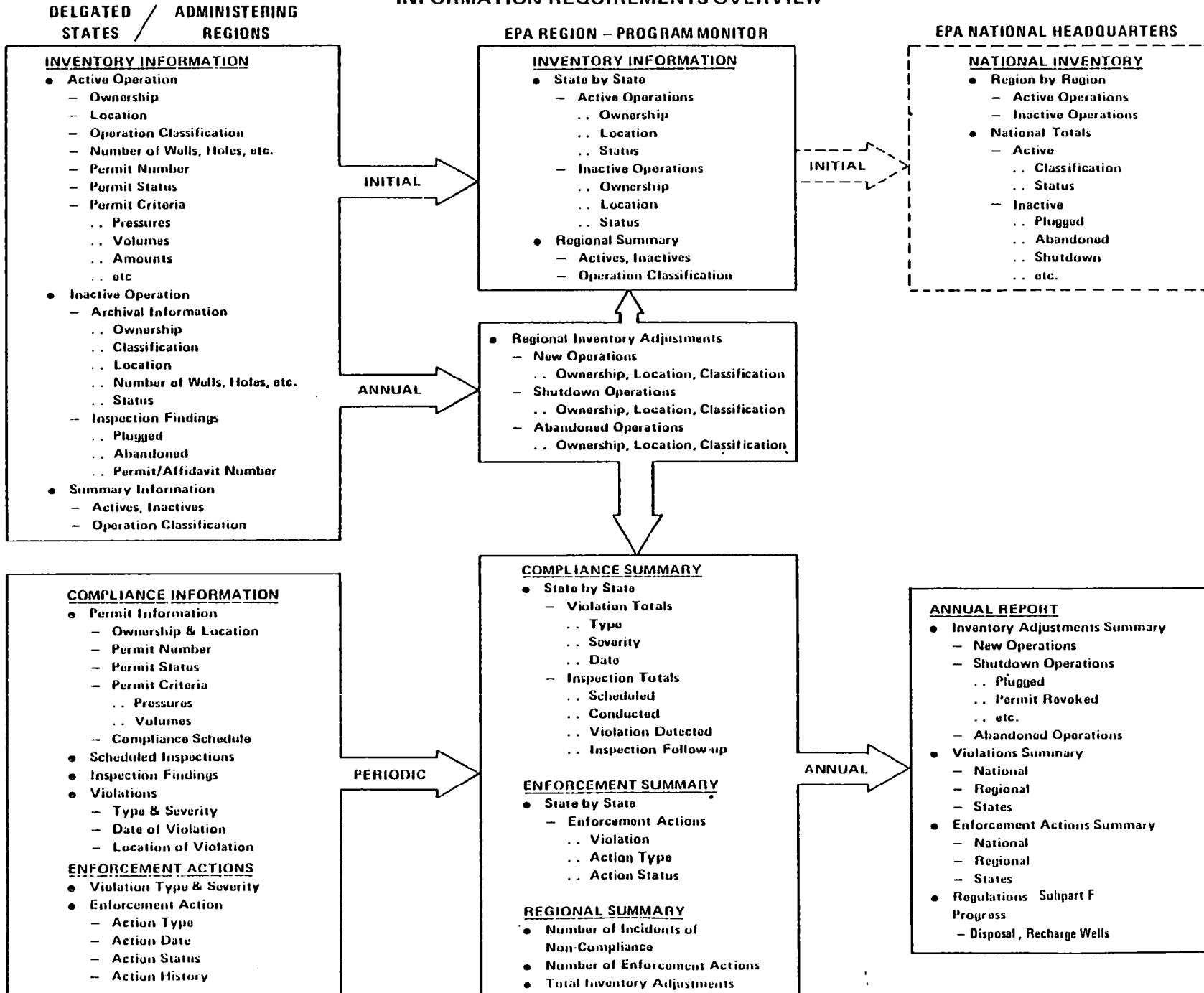
1. UNDERGROUND INJECTION CONTROL INFORMATION SYSTEM REQUIREMENTS

The Underground Injection Control Information System must support the requirements of each of the participants in the Underground Injection Control Program. An overview of these requirements is presented in Exhibit I-1.

As indicated in the exhibit, the role of EPA Headquarters is primarily one of oversight. EPA is required by legislation to obtain an inventory of underground injection operations for those States for which an Underground Injection Control Program is necessary to assure that underground injection will not endanger drinking water sources. States which the Administrator of EPA believes require such a program will be designated and included in the inventory. In addition to the inventory, EPA will provide a monitoring role of the National UIC Program status via required annual reports from the designated States. Such reports are anticipated to include summaries of inventory adjustments, violations, enforcement actions and other program management information.

The EPA Region will either act as a program monitor or the administrator of the program in a designated State, depending upon whether or not the State has accepted primacy. In its role as program monitor, the EPA Region would be required to maintain an inventory of underground injection wells. The Region would also act on behalf of the Administrator of EPA in monitoring the status of the State programs within the Region through required periodic reports.

UNDERGROUND INJECTION CONTROL PROGRAM INFORMATION REQUIREMENTS OVERVIEW



The active administration of the UIC Program in a designated State may be either by the State, if it has been authorized by the Administrator, or by the Region. This role includes:

- . The development and maintenance of an inventory of underground injection wells in the State for both active and inactive operations
- . The issuance and maintenance of permits for underground injection operations
- . The monitoring of underground injection operations via operator self-monitoring reports, scheduled site inspections and other compliance monitoring
- . The initiation of enforcement actions where lack of compliance is identified.

The primary purpose of the Underground Injection Control Information System is the support of the administering organizations, whether State or Region. However, the information system requirements for support of the EPA's National and Regional monitoring requirements have been included in the recommendation for a Federal Reporting System. In the remainder of this section we will focus on the former requirements, the support for the administering organization.

A functional definition of the Underground Injection Control Information System is presented in Exhibit I-2. The functional definition is in terms of those activities the information system would be required to support. These activities include:

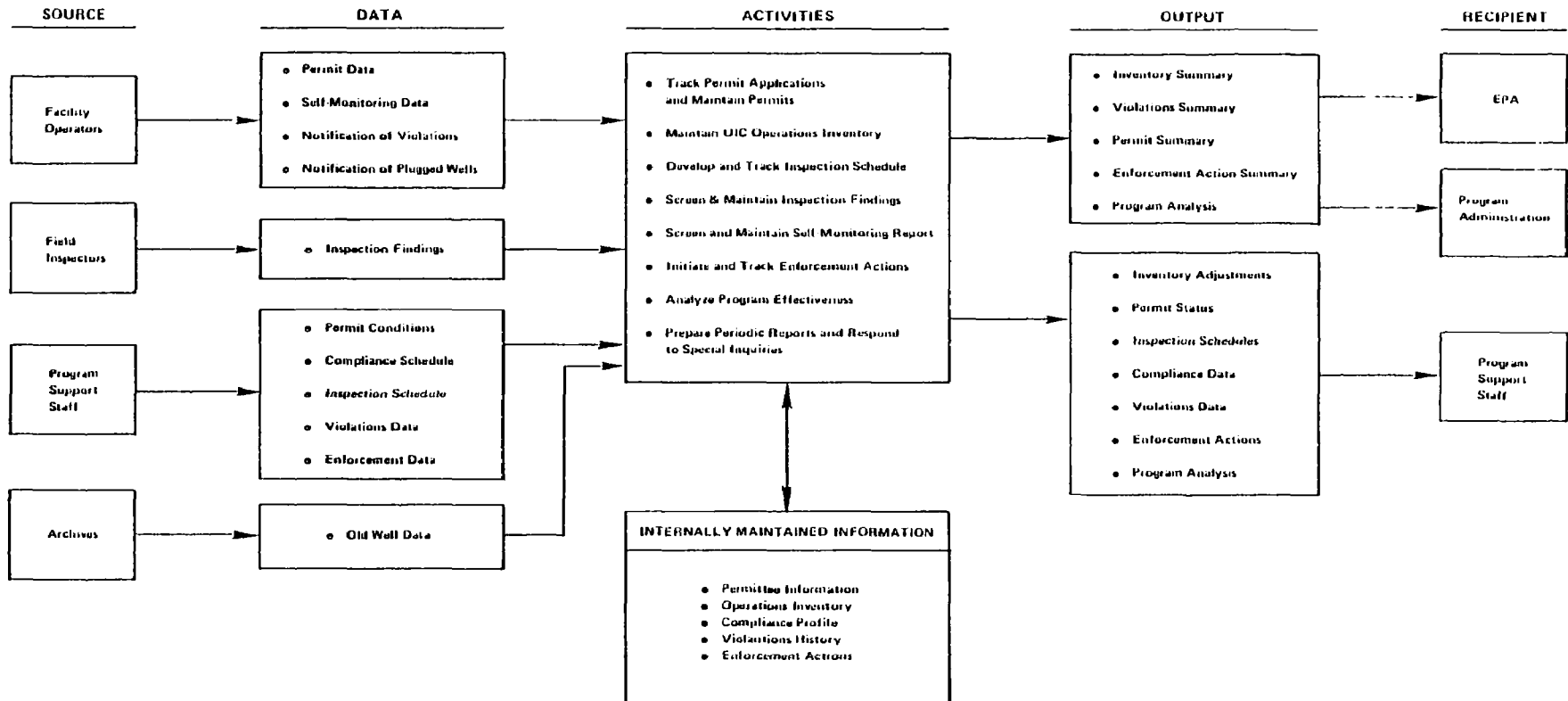
- . Track permit applications and maintain permits - An information system must track the permitting of a UIC operation from the time an operator is identified, through the application process, and, finally, the issuance of a permit. Once the permit is issued, a system should support maintenance of the data regarding permittees and their changes in status.
- . Maintain UIC operations inventory - In response to EPA requirements, a system must maintain an inventory of all UIC operations. This must include both active and inactive UIC operations.
- . Develop and track inspection schedules - Based on the operations inventory and permit status, a system should assist in the scheduling of inspections and the tracking of those inspections for completion.
- . Screen and maintain inspection findings - The reports submitted by the field inspectors should be screened for data validity and analyzed with regard to other current

system data for the UIC operator. They should then be filed and maintained to provide a compliance history for the UIC operator.

- . Screen and maintain self-monitoring reports - The UIC operators are required to submit data from tests on their ongoing operations, for example injection pressures, on self monitoring reports. These reports should be screened against the previous history of that operator's reports and permit conditions, as appropriate. Exception reports should be provided for the program support staff. This data should be maintained in a history file for subsequent analysis.
- . Initiate and track enforcement actions - As possible violations are identified through the various program functions, Enforcement will need to initiate and track enforcement actions regarding a UIC operator. A system could assist in this process by maintaining schedule dates, providing status tracking and continued compliance monitoring.
- . Analyze program effectiveness - Each of the operational activities provides information which can be used for management reporting and program analysis. Such analysis includes trends on numbers of UIC operations permitted, violations, enforcement actions, inspections and other program actions. Statistical data can also be obtained from the operations inventory regarding the type of injection operations, status and other operational data.
- . Answer special inquiries - In addition to the standard reports required by EPA, program administration, and others; there is a need to provide the ability to answer special inquiries with regard to the program status. This might include detailed information on the status of a particular UIC operation or special reports for analysis of the program status.

For each of these activities, the Underground Injection Control Information System should provide the capability to receive, edit, and maintain the information shown in Exhibit I-2 and produce the corresponding outputs. The UIC Program must be able to support all of these requirements in one form or another. It is not clear, however, that in the near term an automated system is required to support all of these activities, nor that an automated system would provide the most effective means of satisfying these requirements. The objective of this study is to assess alternative approaches for meeting these requirements, both in terms of cost and effectiveness. The specific requirements of the program are presented in Chapter II of this report.

UNDERGROUND INJECTION CONTROL INFORMATION SYSTEM FUNCTIONAL DESCRIPTION SUMMARY



2. SUMMARY OF CURRENT ISSUES AND EVALUATION CRITERIA

During the analysis of the UIC Program requirements, we have defined several issues which impact the eventual implementation and operation of the proposed Underground Injection Control Information System. The specific issues are as follows:

- . There are multiple agencies responsible for the administration of the program within the States
- . The jurisdiction with regard to surface impoundments is not resolved
- . The specific regulatory procedures and program implementation approaches are being developed by ODW.

The first of these issues must be addressed by the States in deciding how to administer the programs. The other issues are currently being pursued by the Office of Drinking Water within EPA in the process of developing the necessary regulations for the Underground Injection Control Program. Although these issues will impact the detailed design and implementation of the system, they have only minimal impact on the current feasibility study. However, some assumptions have been made in the cost analysis regarding the implementation strategy of ODW and the level of participation of the States. A more detailed presentation of these issues is given in Chapter II of this report and the assumptions are presented in the cost analysis of Chapter IV. The issues are briefly summarized below:

(1) Multi-Agency Administration

In many States the UIC program involves more than one State agency. These include the commissions which regulate oil and gas production, departments of natural resources, State environmental protection agencies, and various health and conservation groups. This multiple agency administration complicates both the operational requirements needed for a coordinated Underground Injection Control Information System and the periodic reporting required by EPA. EPA is encouraging identification of a single source for the collection, dissemination and coordination of information and program activities. However, the system design must be responsive to the different State configurations and differing agency requirements.

(2) Jurisdiction of Surface Impoundments

Originally pits, ponds and lagoons, known as surface impoundments, were believed to be under the UIC Program. However, this is currently under study by ODW, in conjunction with the States, to better define the issues regarding surface

impoundments. If surface impoundments are to be within Underground Injection Control, the system would be required to support these operations and their program responsibilities. The impact on the system design is the need for flexibility in the design to facilitate the inclusion of these areas in the future.

(3) Evolving Regulatory Environment

In many areas of the UIC program the basic procedures under which the program would operate are still undefined, since ODW is in the development stages of the regulatory process. The undefined areas include:

- . Specific forms and data content have not been developed for Federal permits and self-monitoring reports
- . Enforcement requirements have not been firmly established
- . The specific roles of EPA with regard to States has not been established
- . The identification of designated States has not been completed.

These issues have implications for the costing of the UIC Information System which will be discussed in later sections of this report. However, we do not believe these significantly impact the findings and recommendations of this report, and merely reflect the normal uncertainties involved in advanced planning.

These issues will require resolution prior to the detailed design. Further, there should be continued consciousness by ODW of the impact of the regulations on the design of operational systems to ensure that the regulations are feasible in terms of their implementation. This is particularly true with regard to the permitting process and its relationship to self-monitoring. If self-monitoring is to be of use, there is a need to define the values to be reported upon and these should be consistent with permit conditions.

In addition to the issues, we have identified several criteria for evaluation of the alternatives, both in terms of effectiveness and efficiency. As discussed in Chapter II, these criteria include the following:

- . The system should minimize the reporting burden imposed on States and Regions in their administration of the program.
- . The system concept and its implementation should minimize disruption of the State and Regional organizations. This should include ease of use by program staff, and compatibility with existing systems in terms of both organizational structure and ADP capability.

- . The system design should require a minimal level of technical support for operation and maintenance.
- . The system must be reliable in terms of its edit and accuracy control procedures, both for consistency and responsiveness to the administrative authority.
- . The system must provide the flexibility to adapt to the various organizational forms within the States, and to both State and Regionally operated administration.
- . If operation of the system is to be in the States, the system must be portable to minimize the cost of transfer to various State ADP configurations.
- . The system must support the monitoring function of both EPA Headquarters and EPA Regions with regard to the UIC Program..

These criteria will be used in the requirements analysis to assist in an evaluation of each of the alternatives.

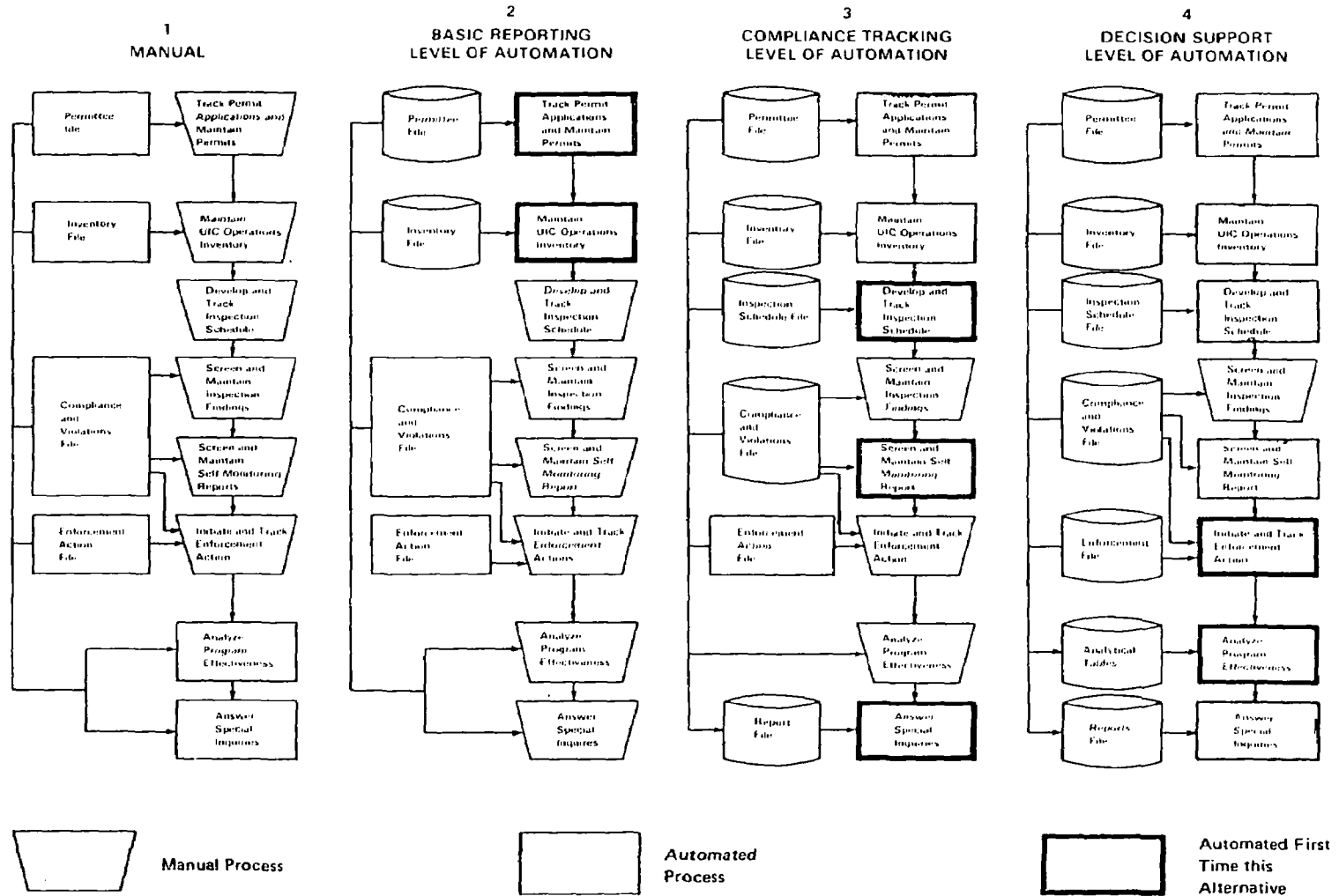
3. ALTERNATIVE SYSTEM CONCEPTS AND IMPLEMENTATION STRATEGIES

The alternatives for the Underground Injection Control Information System include both alternative levels of automation in support of the program and alternative implementation strategies. The alternative levels of automation basically span the range from a completely manual system to automation of each of the activities as described in Section 1. The decision with regard to an implementation strategy is whether or not EPA should implement and support a system which is based in the States, that is a fully distributed system. This approach would be similar to the one utilized by ODW in implementation of the Model State Information System (MSIS). The alternative is to provide a centralized service arrangement for Region and State use. These alternatives are discussed in Chapter III of this report and are presented briefly below.

The alternative levels of automation are presented in Exhibit I-3. As indicated, the alternatives represent successively increasing levels of automation with regard to each activity. The alternatives are as follows:

- . Design Alternative 1 - This alternative is completely manual. There would be no automated support for any of the system processes and separate manual files would be required for the permits, operations inventory, self-monitoring reports, violation files and enforcement action files. The system management would clearly be distributed at the administering organization level, and all management reporting, data management and processing would be manual.

UIC INFORMATION SYSTEM ALTERNATIVE SYSTEM CONCEPTS



- . Design Alternative 2 - This alternative would automate two of the more basic activities in the UIC Program; that is, permit application tracking and maintenance of the UIC operations inventory. These activities are among the most demanding in terms of manual processing. The simplicity of these systems suggests a distributed management system utilizing conventional files. The management reporting would be batch oriented with necessary summary and program reporting performed manually.
- . Design Alternative 3 - In this alternative, in addition to the automation provided under Alternative 2, the screening and maintenance of the self-monitoring reports would be automated. In addition, optional automated tracking of inspection schedules and a special reporting capability would be supported to assist in reporting and basic program analysis.
- . Design Alternative 4 - In addition to the automation of the capabilities provided in Alternative 3, Alternative 4 adds the capability to support Enforcement in action tracking, and program management in detailed analyses of program effectiveness. This concept would require a relatively complex system and represents the limits of what should be automated for the UIC program.

Numerous other alternatives could be considered for automating, or not automating, various subcomponents of these activities; however, we believe that the alternatives presented represent the basic decisions which EPA should make in proceeding with the general design. As the regulations are clarified, the specifics with regard to the details of the design can be developed within this framework.

The other decision is how the system should be implemented with regard to the administering organizations. Clearly, to support the EPA Regions in managing designated States for which EPA retains administrative authority, a centralized system must be supported on an EPA computer, either the Washington Computer Center (WCC) or the National Computer Center (NCC). For those States taking primacy, the situation is considerably more complicated. The options for a primacy State are as follows:

- . The State could use a centralized EPA system through one of the EPA data centers
- . The State could support the UIC program providing a manual interface to the Federal Reporting System
- . The State could utilize its own automated system with an automated interface to the Federal Reporting System

- . The State could use a version of a standard UIC Information System supported by EPA, but operated on a State facility.

Since EPA must develop a computerized system to support its own requirements, the decision for EPA is whether it should also provide the implementation and operational support for a distributed mode of operation in the States. That is, whether EPA should build a version of the UIC Information System which is transferrable to the states for operation on their own equipment. States which desire to utilize a centralized EPA system would have the access to that system regardless of whether or not the distributed capabilities are supported by EPA. This decision does not impact the fact that interfaces will have to be designed with a Federal Reporting System for manual entry of data, entry from a standardized EPA system, and from the custom UIC systems currently operational in several States.

4. COST EFFECTIVENESS ANALYSIS

In order to determine which of the alternatives and implementation strategies are most appropriate for implementation by EPA, we have analyzed each in terms of both the costs attributable to the systems and the impact on EPA's management and operation of the Underground Injection Control Program. In Chapter IV of this report, we present our detailed analysis of the costs of these alternatives over a five year horizon and evaluate the impact of these alternatives in some detail. In this section we present a brief overview of this analysis in order to provide an understanding of our recommendations.

(1) Cost Methodology and Assumptions

The cost estimates presented include both the direct out-of-pocket expenditures by EPA and opportunity costs incurred by EPA. The estimated out-of-pocket costs include such items as: expenditures on contractors for design, development, and implementation; computer resources supplied by MIDSD; and contractor data entry. These items would be directly budgeted items for the program. In addition, we have estimated the opportunity costs to EPA for the Underground Injection Control Information System. These costs primarily include the personnel required by headquarters and the Regions to support the system processes. These are opportunity costs in the sense of opportunity lost. That is, although EPA may not hire additional personnel for support of the system processes, the commitment of these personnel represents a loss of these capabilities for performance of other EPA functions. Our analysis of the state-level operations utilized the same methodology for costing as for the EPA Regions, with adjustment for the impact of distributed operation. Full costs were developed in each case; however, the analysis did not consider to whom the cost would be attributable.

Because of the complexity of the decisions which face ODW in analyzing its alternatives for the Underground Injection

Control Information System, we have presented the costing in two steps, oriented to the specific decisions. That is, we first make the decision as to what level of automation should be developed by EPA. This is presented in terms of the design and development of a system for EPA's own needs in administering State programs through the Regions. Given the level of automation appropriate to EPA, we then proceed with the decision as to whether EPA should invest the additional funds in developing a distributed system to support the States who would prefer this approach. More detailed decisions, such as whether to proceed with a data base management system, are deferred to the general design process where sufficient detail can be developed with regard to the data element content and structures.

(2) The Level of Automation Decision

In developing the cost to support the first decision, that is the appropriate level of automation, we have developed the following cost estimates for each alternative:

- . The costs for the design and development of the Underground Injection Control Information System from detailed design through systems test.
- . The cost to EPA Headquarters for the prototype implementation and operational maintenance of the system.
- . The additional implementation and operational costs for a typical small State administered by a Region (where small is defined as a State containing approximately 1,000 active UIC operations).
- . The additional implementation and operations cost for a large State supported by an EPA Region (where large is defined as approximately 35,000 UIC operations).

The first two of these costs is basically the fixed cost that would be incurred for the design and operation of a UIC Information System, where the latter two are incremental costs for the implementation and operation of each State within a Region. These costs are presented in Exhibits I-4 and I-5 for both the base estimates and the full life cycle costs.

In order to decide on an alternative both the fixed and incremental costs have to be considered. Presented in Exhibit I-6 is a graphic display of the estimated life cycle costs for implementation and operation of an Administrative Agency (State) as a function of its number of UIC operations. The costs do not include EPA's fixed costs, they are the incremental costs per State. The projections are based on the two cost estimates, large and small, for each of the alternatives. This projection assumes a linear relationship. For all alternatives the costs, as

EPA HEADQUARTERS LIFE CYCLE COST SUMMARY

(DOLLARS IN THOUSANDS)

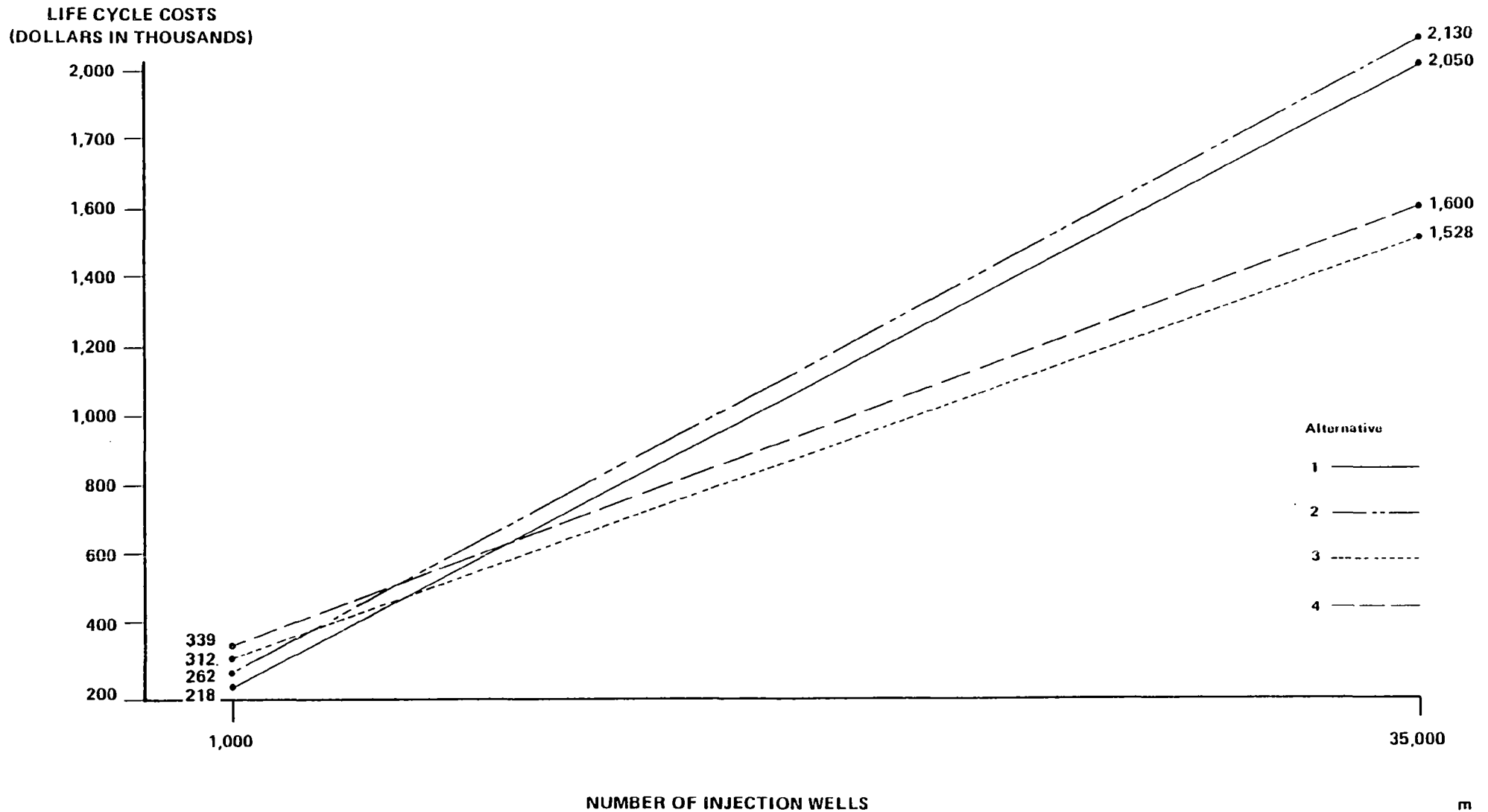
| | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|----------------------|---------------|-------------|-------|---------------|-------------|-------|---------------|-------------|-------|---------------|-------------|-------|
| | Out of Pocket | Opportunity | Total | Out of Pocket | Opportunity | Total | Out of Pocket | Opportunity | Total | Out of Pocket | Opportunity | Total |
| Design & Development | 48.5 | 5.5 | 54.0 | 153.2 | 31.6 | 184.8 | 274.6 | 48.4 | 323.0 | 382.8 | 73.2 | 456.0 |
| Implementation | - | - | - | 9.8 | 2.8 | 12.6 | 16.7 | 5.6 | 22.3 | 17.7 | 6.3 | 24.0 |
| Operation | .6 | 3.3 | 3.9 | 118.2 | 121.6 | 239.8 | 163.6 | 121.6 | 285.2 | 195.0 | 139.8 | 334.8 |
| Life Cycle | 49.1 | 8.8 | 57.9 | 281.2 | 156.0 | 437.2 | 454.9 | 175.6 | 630.5 | 595.5 | 219.3 | 814.8 |

**ADMINISTRATIVE AGENCY
LIFE CYCLE IMPLEMENTATION & OPERATIONS
COST SUMMARY**

(DOLLARS IN THOUSANDS)

| | | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|--------------------------------|----------------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|
| | | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total |
| SMALL ADMINISTRATIVE AGENCY | Implementation | 8.7 | 23.2 | 31.9 | 25.8 | 4.6 | 30.4 | 33.3 | 7.7 | 41.0 | 36.3 | 8.1 | 44.4 |
| | Operation | 8.4 | 195.7 | 204.1 | 81.3 | 150.2 | 231.5 | 132.6 | 139.1 | 271.7 | 145.4 | 149.2 | 294.6 |
| | Life Cycle | 17.1 | 218.9 | 236.0 | 107.1 | 154.8 | 261.9 | 165.9 | 146.8 | 321.7 | 181.7 | 157.3 | 339.0 |
| LARGE ADMINISTRATIVE AGENCY | Implementation | 15.0 | 319.0 | 334.0 | 447.9 | 12.4 | 460.3 | 454.9 | 16.8 | 471.7 | 458.0 | 17.4 | 475.4 |
| | Operation | 28.9 | 1688.0 | 1716.9 | 165.3 | 1504.6 | 1669.9 | 392.5 | 664.3 | 1056.8 | 459.9 | 665.2 | 1125.1 |
| | Life Cycle | 43.9 | 2007.0 | 2050.9 | 613.2 | 1517.0 | 2130.2 | 847.4 | 681.1 | 1528.5 | 917.9 | 682.6 | 1600.5 |

IMPLEMENTATION AND OPERATION COSTS AS A FUNCTION OF NUMBER OF INJECTION
WELLS FOR AN ADMINISTRATIVE AGENCY



expected, increase with the number of operations; however, not at the same rate. In fact most of the automated alternatives rapidly overcome the lower implementation costs for the manual approach.

This is an over-simplification of the costs and cost relationships. We would not expect linear relationships, but rather that the automated options would exhibit some concavity due to economies of scale in the automation. However, the chart does illustrate that the more advanced automated alternatives overtake the manual and minimal automation alternatives as soon as the number of injection wells move up around 6,000.

It is important to point out that the cost analysis, and this illustration address the selection of one of the alternative system concepts, not the determination as to which state or region should automate. There are considerable cost estimation errors in any initial feasibility study. These estimates for a UIC system can and should be extended once the general and detailed designs have been completed. At that time the estimates should have a reliability which would offer the potential for making decisions as to system implementation for a specific state or region.

Exhibit I-7 presents these costs from another perspective. This exhibit displays the full life cycle costs, including EPA's fixed costs for design through operation, for a large Administrative Agency (State). This basically presents the costs to EPA if only one State were implemented. The lowest cost is for the manual approach, which indicates that development of an independent UIC Information System would not be justified for an individual State. However, implementation of Alternative III by EPA can almost be cost justified for one large State implementation. Assuming more than one such State will utilize the system, the cost savings are potentially significant.

Based upon these estimates, we believe that, if EPA is to administer at least one large State, the additional cost for implementation, design, and development of Alternative III over Alternative I is justified in terms of life cycle cost. This primarily reflects the substantial decrease in operating cost due to the automated screening and maintenance of self-monitoring reports in Alternative III. Alternative IV provides the same capability but is always more costly than Alternative III. Alternative IV also provides management analysis and support capability; however, this added complexity does not appear justified in the near term.

On the assumption that more than one large State, or Region with a large State, will utilize the UIC Information System, we recommended implementation of Alternative III. This is based upon:

**LIFE CYCLE COST PROJECTIONS
(DOLLARS IN THOUSANDS)
LARGE STATE**

| Cost Components | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|---|------------------------|-------------------|---------------|------------------------|-------------------|---------------|------------------------|-------------------|---------------|------------------------|-------------------|---------------|
| | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total |
| System Design & Development | 48.5 | 5.5 | 54.0 | 153.2 | 31.6 | 184.8 | 274.6 | 48.4 | 323.0 | 382.8 | 73.2 | 456.0 |
| EPA Headquarters Implementation and Operations | .6 | 3.3 | 3.9 | 128.0 | 124.4 | 252.4 | 180.3 | 127.2 | 307.5 | 212.7 | 146.1 | 358.8 |
| Administration Agency Implementation and Operations | 43.9 | 2007.0 | 2050.9 | 613.2 | 1517.0 | 2130.2 | 847.4 | 681.1 | 1528.5 | 917.9 | 682.6 | 1600.5 |
| LIFE CYCLE | 93.0 | 2015.8 | 2108.8 | 894.4 | 1673.0 | 2567.4 | 1302.3 | 856.7 | 2159.0 | 1513.4 | 901.9 | 2415.3 |

- . Alternative III offers the lowest implementation and operation cost to an Administrative Agency for all but the smallest agencies.
- . Implementation in only one large Administrative Agency almost cost justifies EPA's fixed costs.
- . Alternative III minimizes the manual reporting burden on the Administrative Agency.
- . The added complexity of Alternative IV does not meet the evaluation criteria for minimizing required levels of technical support. It provides additional capability at added cost. These enhancements can be added later, when the Program has matured and there is greater certainty of the need.
- . Alternative III provides significantly more management reporting and analysis capability than Alternative II, as well as a cost advantage.

In summary, Alternative III offers significant advantages to EPA both in terms of cost and effectiveness.

(3) The Implementation Strategy Decision

Once a decision was made with regard to recommendation of Alternative III, we proceeded with the analysis of which implementation strategy would be most appropriate for EPA. To accomplish this we estimated each of the above cost components for the case in which EPA would design, develop, implement, and support the system on a distributed basis. This would require EPA to implement and support operation of both the centralized system and distributed State systems.

In the costing of the distributed systems, costs were included for the additional development costs for the portability of the distributed system, additional training for the State programs, and additional system maintenance cost in both EPA and the States. We decreased some cost items, such as the telecommunications costs, which would not be incurred by a State utilizing the distributed system.

In order to provide EPA with some basis for the magnitude of the cost impact for the centralized vs. distributed approach, while considering all of the various options the States would have in terms of primacy, we developed a series of three scenarios for the UIC program. These considered several different possibilities for the program in terms of the decisions of the designated States who accept primacy. These scenarios ranged from an assumption that many of the States would proceed with their own systems, to the potential that many of the States would

participate with EPA in the UIC Information System. These scenarios are presented in Exhibit I-8. The cost impacts of these scenarios versus the centralized/distributed decision are presented in Exhibit I-9.

Clearly, in each case the distributed strategy incurs significant additional costs. These additional costs must be weighed against the benefits that may be provided by a distributed system. The analysis considered the following:

- . The distributed approach incurs significant additional costs for operations and system maintenance because each version of the system must be maintained separately.
- . The distributed approach may encourage more States to utilize the UIC Information System, reflecting confidentiality concerns in a centralized approach.
- . The centralized approach facilitates further system enhancement and relieves the State of local operational burdens.
- . The distributed approach offers the State additional flexibility for customizing; however, at the substantial risk of major system maintenance costs.

The estimation of the probability of which scenarios might occur and the impact of the system on State decisions versus other program considerations is well beyond the scope of the study. However, because of the limited number of States believed to be influenced by this decision, we believe that the additional cost of the distributed approach would not be justified for the UIC Program. As a result, we have recommended the centralized approach for the development of an initial system. To the extent possible, the systems design should be developed in a manner which encourages States to participate with EPA on a centralized basis. This would include prime consideration in the design of the UIC Information System of the protection of the confidentiality of the State's data while on a system operated by EPA.

5. RECOMMENDATIONS

In summary, as a result of our cost effectiveness analysis, we have concluded with the following recommendations:

- . EPA should implement the conceptual design presented in Alternative III
- . EPA should proceed with the development of a centralized system, while emphasizing support for State concerns in the design.

**SCENARIOS FOR CENTRAL VS DISTRIBUTED
ALTERNATIVE IMPLEMENTATIONS**

| CENTRALIZATION ALTERNATIVE | | | | |
|----------------------------|-------|---------------|--------------------|-------------------|
| Scenario | State | Primacy State | | Non-Primacy State |
| | | Own System | EPA Central System | |
| 1 | Small | 6 | 4 | 1 |
| | Large | 5 | 1 | 2 |
| 2 | Small | 4 | 5 | 2 |
| | Large | 4 | 2 | 1 |
| 3 | Small | 1 | 7 | 3 |
| | Large | 5 | 1 | 1 |

| DISTRIBUTED ALTERNATIVE | | | | | |
|-------------------------|-------|------------|--------------------|------------------------|-------------------|
| Primacy State | | | | | |
| Scenario | State | Own System | Central EPA System | Distributed EPA System | Non-Primacy State |
| 1 | Small | 6 | 2 | 2 | 1 |
| | Large | 5 | — | 1 | 1 |
| 2 | Small | 4 | 3 | 2 | 1 |
| | Large | 4 | 1 | 1 | 1 |
| 3 | Small | 1 | 4 | 3 | 3 |
| | Large | 5 | — | 1 | 1 |

**ALTERNATIVE SCENARIOS LIFE CYCLE COST PROJECTIONS
(DOLLARS IN THOUSANDS)**

| Alternative Scenario | Cost Components | CENTRAL | | | DISTRIBUTED | | |
|----------------------|--|------------------------|-------------------|--------------|------------------------|-------------------|--------------|
| | | Out-of-Pocket Expenses | Opportunity Costs | Annual Total | Out-of-Pocket Expenses | Opportunity Costs | Annual Total |
| 1. | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementation and Operations | 2524.3 | 2096.2 | 4620.5 | 2886.6 | 2560.1 | 5446.7 |
| | LIFE CYCLE | 2979.2 | 2271.8 | 5251.0 | 3426.1 | 2769.4 | 6195.5 |
| 2 | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementation and Operations | 3,703.5 | 3,070.9 | 6,774.4 | 4,065.8 | 3,534.8 | 7,600.6 |
| | LIFE CYCLE | 4,158.4 | 3,246.5 | 7,404.9 | 4605.3 | 3744.1 | 8349.4 |
| 3 | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementations and Operations | 3353.8 | 2830.2 | 6184.0 | 3801.9 | 3451.0 | 7252.9 |
| | LIFE CYCLE | 3808.7 | 3005.8 | 6814.5 | 4341.4 | 3660.3 | 8001.7 |

These recommendations would provide the EPA Regions, and any State which desires to participate, with the automated capability for permit application tracking and maintenance, maintenance of a UIC operations inventory, the tracking of inspection schedules, screening and maintenance of self-monitoring reports, and a basic report analysis and inquiry capability. The enforcement action tracking and more sophisticated program analysis capability would be left for system enhancements and the resolution of the regulations.

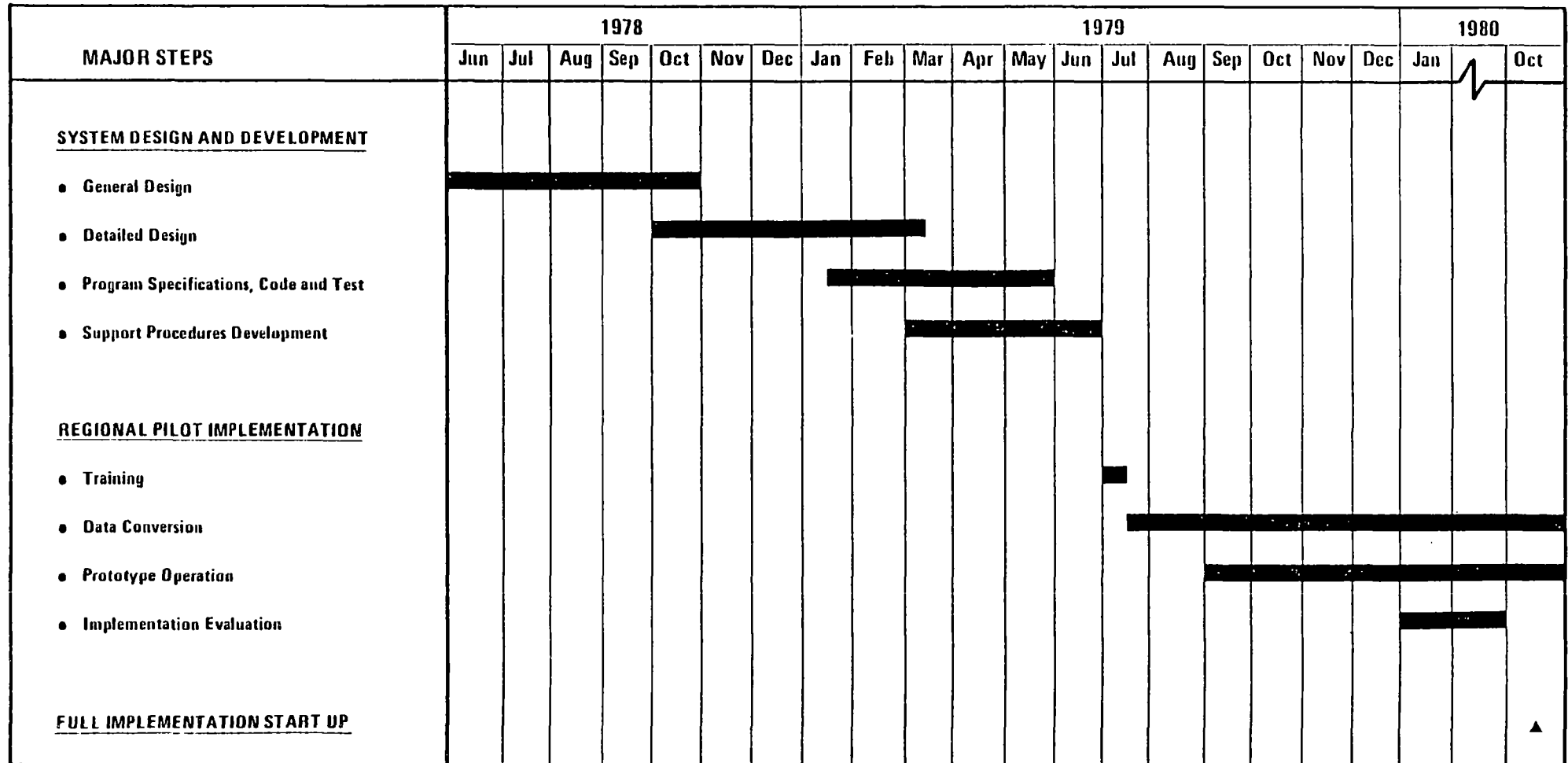
The time schedule for the implementation of this recommendation is presented in Exhibit I-10. As shown, the milestones beginning with the general design through implementation are coordinated with the anticipated date for the promulgation of the regulations. In addition to the recommendations above the implementation approach presents some additional recommendations. These include the following:

- . The specific requirements of the Federal Reporting System to support the monitoring role of EPA Headquarters and Regions should be defined as soon as practicable. A preliminary concept for these requirements is presented in Chapter V.
- . We recommend that the system should first be implemented only for the oil and gas area of the Underground Injection Control Program, and that the other types of operations/injection wells be added to the data base on a phased basis.
- . Before general release of the UIC Information System, the system should be thoroughly prototype tested in a small State for which EPA is the administering authority.
- . The implementation of the system, even if centralized, should be kept simple until EPA and the States have resolved the initial issues normal in any emerging program.

The other design decisions, such as whether a DBMS should be utilized in the centralized system, whether the system should be installed on WCC or NCC, and the details of the system design are left for the analyses in the general systems design process.

In summary, we recommend that the Office of Drinking Water proceed with the general design of a Underground Injection Control Information System. This system would provide the automation of many of the basic files for maintaining the UIC inventory, permitting, and compliance monitoring while avoiding the more sophisticated applications required in other activities of the program. To the extent practicable the centralized design should be made as attractive as possible to the States to encourage their utilization of the system on a centralized basis.

UIC MANAGEMENT INFORMATION SYSTEM IMPLEMENTATION PLAN



II. REQUIREMENTS ANALYSIS

II. REQUIREMENTS ANALYSIS

The Office of Drinking Water (ODW) of the U.S. Environmental Protection Agency is currently in the process of finalizing regulations for implementation of a State Underground Injection Control (UIC) program. These regulations will establish minimum requirements for effective State programs to prevent underground injection practices which endanger underground sources of drinking water. The regulations are being prepared in accordance with Subtitle C of the Safe Drinking Water Act of 1974.

ODW is in the process of assessing the feasibility of developing a data management system to meet State requirements for management of the UIC program, and to support its role as a program monitor. The information requirements necessary for effective management and monitoring of the UIC program are presented in this chapter. The requirements analysis is presented in four sections:

- . Background - describes the practice of underground injection and briefly discusses the legislative history of events leading to the requirement for a UIC program; identifies the objectives and activities of such a program, and describes the current environment.
- . Information Requirements - identifies the three levels of UIC program management, their structure, and information requirements.
- . Issues - presents issues which affect UIC program data management.
- . Evaluation Criteria - presents the criteria that will be used to evaluate the alternative system concepts. These include both user (effectiveness) and design (efficiency) oriented criteria.

1. BACKGROUND

Today the drinking water for over 100 million Americans comes from underground sources. These sources, commonly referred to as groundwater, are found in geological formations known as aquifers. Aquifers contain enough saturated permeable material to surrender significant quantities of groundwater to wells or springs. Historically groundwater has been relatively free of contaminants that would create pollution and effectively eliminate it as a source of drinking water. A recent increase in the practice of subsurface emplacement of fluids by various industries has led to the growing possibility of groundwater contamination.

(1) Types of Underground Injection

Far and away the largest number of operations which employ subsurface emplacement of fluids are related to the production of oil and gas. These operations include:

- . Enhanced recovery wells which are used to inject fluids for the purpose of stimulating production of oil or natural gas
- . Brine disposal wells which are used to dispose of salt water or other fluids which are brought to the surface during oil or gas production.

There are other types of operations which require the subsurface emplacement of fluids. Although these operations are not nearly as numerous as those related to oil and gas production, they do include some of the most contaminating substances injected. These operations include:

- . Hydrocarbon storage wells which are used to inject hydrocarbons into an underground foundation for storage purposes; or which are used for injection of fluids for the purpose of recovery of stored hydrocarbons
- . Industrial disposal wells which are used for injecting industrial wastes
- . Municipal disposal wells which are used for the injection of effluent from a municipal collection, storage or treatment facility
- . Solution mining wells which are used to inject a fluid containing leaching chemicals for the purpose of recovering metals such as copper and uranium; or to inject water or other fluids for dissolving, for subsequent recovery, minerals such as sodium chloride, potash and phosphate
- . In situ gassification wells which are used for the injection of air and fuels to gassify fossil fuels such as coal, tar sands and oil shale
- . Drainage wells which are used for injection of urban, agricultural or highway runoff and excess ponded surface waters.

In addition to these several other types of wells are used for subsurface emplacement. These include nuclear waste disposal or storage wells, domestic septic system wells, recharge wells, air conditioning return flow wells, cooling water return flow wells, salt water intrusion barrier wells and subsidence control wells.

One additional operation which can result in the subsurface emplacement of fluids, and thus pose a potential groundwater contamination hazard, is surface impoundments. Surface impoundments consist of pits, ponds, or lagoons which are used for storage or disposal of wastes. The contamination threat from surface impoundments is caused by the potential for seepage into the ground of the contents of the pit, pond, or lagoon.

(2) Legislation and Implementation

In 1974, Congress enacted the Safe Drinking Water Act. This Act amended the Public Health Service Act "to assure that the public is provided with safe drinking water." Two mechanisms have been established to meet this goal:

- . Establishment of minimum Federal Standards that all public water systems must meet
- . Development of a program to protect underground drinking water sources via a Federal/State cooperative effort based on the predetermined standards and regulations administered by the States. This program shall:
 - prohibit any underground injection not authorized by State issued permits or rules;
 - ensure that permit or rule applicants satisfy minimum standards;
 - include inspection, monitoring, record keeping and reporting requirements;
 - apply to all practitioners of underground injections, including Federal agencies;
 - not interfere with or impede oil and gas underground injection and related activities as long as they do not endanger underground sources of drinking water.

Regulations are currently under development to support the underground injection control program. These regulations have been drafted and are currently under going internal review at EPA. They are scheduled to be proposed by June, at which time there will be a sixty (60) day period of comments by affected parties. At the end of the 60-day comment period, EPA will have another 60 days to review and respond to the comments received. After this second 60 day period, the regulations will be published in the Federal Register as final. The regulations will become effective 270 days after publication in final form.

The implementation of the national program to control the practice of underground injection of these fluids will utilize

a phased approach. The objective of this approach is to allow for a manageable program implementation process. While the ultimate goal is to include all 56 States and territories in the program, the initial phase is limited to those States in which there is known, significant practice of underground injection. The Administrator will designate the States which are to be included. A State will be a candidate for designation if, in the judgement of the Administrator, "a State underground injection control program may be necessary to assure that underground injection will not endanger drinking water sources."

A designated State which desires primary enforcement responsibility (primacy) is required to provide proof by means of an application to the Administrator. The application must show that the State has adopted and will implement a UIC program which satisfies the requirements of EPA regulations, and will maintain records and submit reports in conjunction with its UIC program activities as may be required by regulation. When the application is approved by the Administrator, the State is assigned primacy for its underground injection control programs; otherwise, the corresponding Region will retain primacy.

(3) Program Participants and Responsibilities

The UIC program is designed to monitor underground injection practices which have the potential to contaminate water, and to report the information to three levels of program management. These three levels consist of EPA Headquarters, EPA Regional Offices, and the individual States. Each level has responsibility for several aspects of the program.

. National Level

At the national level, EPA Headquarters has the responsibility of overall program management. This responsibility includes designating States which require underground injection control programs, obtaining an initial inventory of underground injection facilities in designated States, and monitoring program status on a nationwide basis through annual reports. The primary responsibility for designated States to be included in the program lies with the Administrator. His decision is based on information supplied by both Headquarters and Regional personnel, regarding the danger to underground drinking water sources.

Proposed regulations also provide grants for States to assist in funding of UIC or underground water source protection programs. Primacy would serve as a basis for allocation of grant funds in the first year. Non-designated States could also apply for funds if they can demonstrate the need for a UIC program. In the first year, proposed allocations would be made to States on the basis of

population, geographic area, and quantity of ground water used for drinking water. In subsequent years, allocation would be made on the basis of the number of underground injection facilities within a State as well.

The requirement for obtaining a national inventory of injection wells, therefore, is multi-fold. A primary purpose of this inventory will be in support of the allocation of available grant funds to States with primacy. In addition, the availability of a national inventory allows Headquarters to respond to inquiries concerning number of facilities, location of facilities, types of facilities, and other facility inventory related information. These inquiries will be forthcoming from Congress, special interest groups and perhaps other Federal agencies. Finally, the inventory will provide a source of data for analysis of nationwide trends and conditions useful in long-range planning.

The ability to effectively monitor the UIC program at the national level depends on the program information received by Headquarters. The regulations require that each State that has primacy must submit an annual report to EPA. The ultimate recipient of all the annual reports is EPA Headquarters. The information required on the annual report includes a summary of violations and enforcement actions taken, an updated account of inventory additions and deletions, and other information as required by regulation. Through this information Headquarters can identify possible areas of priority during the upcoming program year. These areas of priority may include:

- Specific geographic areas where an overwhelming number of violations have occurred
- Specific types of operations which are more in violation than others
- Areas where new types of injection operations are emerging.

The areas of priority effectively dictate the oversight direction that Headquarters will take in the upcoming year. This direction is then relayed to the EPA Regions and the authorized States.

Regional Level

The Regional office can have a dual role in the program. A designated State may accept or reject primary enforcement responsibility (primacy) for the Underground Injection Control program. When the State accepts primacy, the Regional EPA office acts as a program monitor and assists

the State's efforts as required. However, should a State reject primacy, the Regional EPA office would assume the additional role of program administrator.

As program monitor, the Regional EPA office:

- Reviews and acts on State requests for primacy determination
- Monitors regional program status through required periodic reports
- Provides technical assistance to States upon request
- Maintains a current regional inventory of underground injection wells.

As program administrator, the activities of the regional EPA office would duplicate the activities of the primacy State described in the next section. In the program monitoring role, the Regional Administrator (RA) is considered an agent of the Administrator and as such performs many functions which the law and regulations require of the Administrator. Among these functions the RA and appropriate regional staff review States' requests for primary enforcement responsibility and approves or denies the requests. The RA will also supply information to the Administrator to support the State designation process.

In its role as program monitor the Region will require periodic reports from authorized states. These reports will provide a summary of violations, enforcement actions, inventory additions and deletions, and other information as required by regulation. The information from these reports will permit the Region to effectively monitor the UIC programs within its jurisdiction. The information will also allow the Region to respond to inquiries from affected parties, interest groups and the general public.

A national inventory of injection wells would be, in reality, the sum of the Regional inventories. The Regions would develop the actual inventory information. As the Region obtains inventory information from its States and updates its existing inventory, it would, in effect, update the national inventory. The regional inventory would be used primarily as a control list of underground injection facilities. The data in the inventory could be manipulated to perform trend analyses by State, by type of injection activity, and other inventory data elements. The inventory would also support the Region's responsibility to respond to inquiries concerning the UIC community size and distribution.

State Level

Primacy States act as program administrators. In this role, the State issues permits for underground injection operations, monitors operations through the use of operator self-monitoring reports and on-site inspections, maintains a current inventory of State underground injection wells, and minimizes violations through monitoring and enforcement actions. The State is also responsible for periodic reporting on program status to the Regional EPA office. This role will be discussed in detail below, since it is in support of this role that the proposed system is focused.

A State which has not taken primacy would have its Federal underground injection control program administered by the EPA Region in which it resides. The non-primacy State is under no formal obligation to provide the administering Region with information required by the regulations. Operators would submit reports directly to the EPA regions, and inspections and enforcement actions would be performed by the Region.

(4) Current State Environment

As previously indicated, there is a wide variety of wells which may pose a danger to underground drinking water sources. These include oil and gas production shallow disposal well operations, hydrocarbon storage wells, industrial and municipal disposal wells, solution mining wells, nuclear waste disposal and storage wells, in situ gassification wells and drainage wells. This broad array includes different types of industries which may be regulated at the State level, not by a discrete UIC program, but by a variety of health and environmental protection programs and organizations within the State government. These organizations may all reside within a single State agency, or they may encompass a number of State agencies. Thus, there are two kinds of State administered programs:

- . Programs administered by a single State agency
- . Programs administered by multiple State agencies.

The separation of multiple agency responsibility (or multiple organization responsibility within a single agency) usually occurs between oil and gas production and other underground injection activity. There are additional separations of functions among health and conservation groups. The types of agencies which are administering or will administer the UIC program in the designated States include:

- . Commissions which regulate oil and gas production

- . Department of Natural Resources
- . State Environmental Agency
- . State Department of Health
- . State Water Resource Agencies
- . State Departments of Conservation.

Many of these agencies currently administer programs to control underground injection activities. These programs are regulated by State enacted legislation. In some instances, State legislation and regulations are more stringent than the Federal regulations which have been developed.

The EPA position with regard to State programs regulating underground injection practices is not to supplant the State regulations, but simply to ensure that the State program is effective. Indeed, the Agency will guide and encourage adoption of State UIC programs, to include providing grants and data management tools to assist the State programs. The UIC program is viewed as a cooperative effort between EPA and the States. An initial set of Federal regulations was submitted to the States for review. The regulations were subsequently modified to reflect State comments and will soon be distributed for another review. This kind of interaction between the States and EPA is essential for the implementation of an effective UIC program.

2. INFORMATION REQUIREMENTS

The activities at the three levels of UIC program management described previously require different levels of information to support them. In this section we present the kinds of information required at the State, Regional and National levels. The information is described in terms of program administration needs and program monitoring needs. Therefore we present the information requirements of:

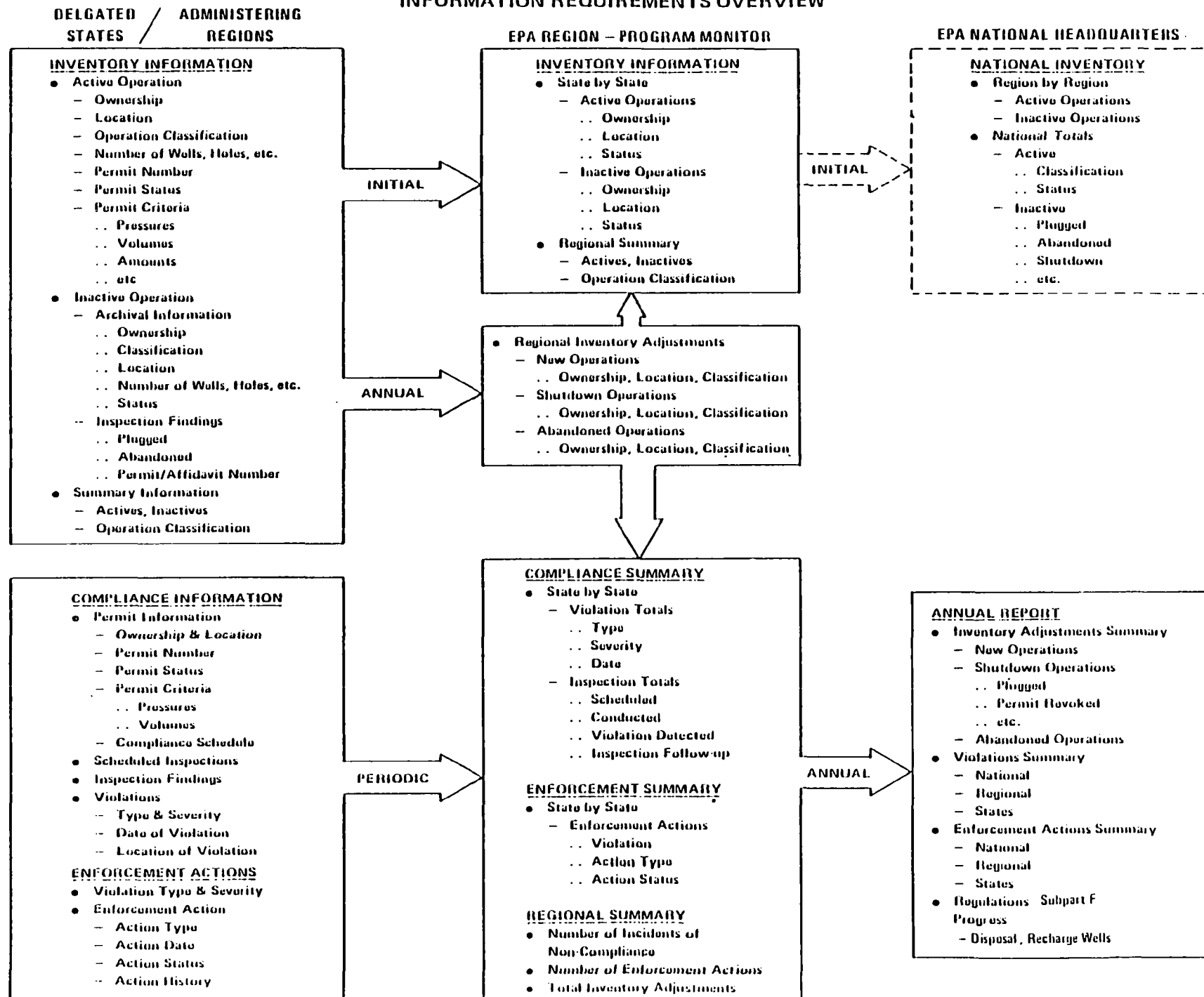
- . Administering State or Region
- . Monitoring Region
- . National Headquarters.

Exhibit II-1 contains an overview of the information requirements for each of these levels of program management.

(1) Administering State or Region

The objective of the administering agency or organization is to effectively manage the UIC program for which it is

UNDERGROUND INJECTION CONTROL PROGRAM INFORMATION REQUIREMENTS OVERVIEW



responsible. This objective is accomplished through such activities as:

- . Granting permits
- . Compliance monitoring via site inspection and self monitoring report screening
- . Compiling and maintaining an inventory of underground injection operations
- . Minimizing violations through effective enforcement action.

These activities require certain items of information that will enable them to be carried out successfully and provide for effective program administration. These information requirements are basically the same, regardless of whether it is a single agency environment or a multiple agency environment, or an administering region.

Exhibit II-2 depicts the activities associated with administering the UIC program, and the information required to carry out the activities.

- . Granting Permits

This activity consists of reviewing permit applications submitted by underground injection operators, issuing a permit to the operator and maintaining a file of active Permittees. The information required to support this activity comes from the permit application. This application provides the following information:

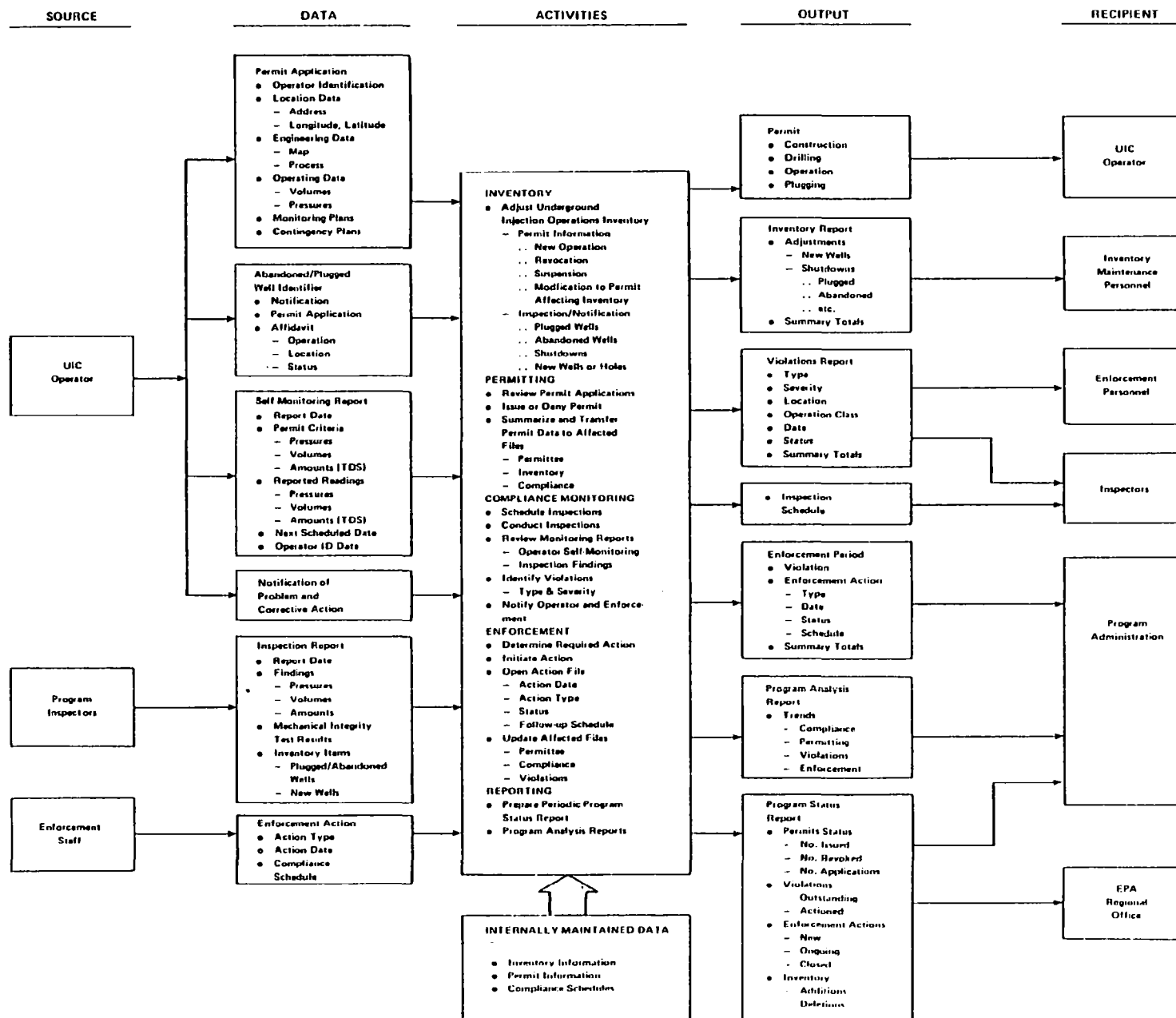
- Operator identification and location
- Operation description including engineering, geological and hydrological information
- Equipment and techniques for operation monitoring and contingency plans in case of failure of underground system.

With this information the program administrator can make a decision to issue or deny a permit. With the issuance of a permit the Permittee file is created. This file contains required permit application data, the assigned permit number, and permit conditions and schedules.

- . Compliance Monitoring

This activity consists of screening operator self-monitoring reports, scheduling and conducting site inspections,

**UNDERGROUND INJECTION CONTROL PROGRAM
INFORMATION REQUIREMENTS AND PROCESSING FLOW
ADMINISTERING STATE OR REGION**



reviewing site inspection reports, identifying violations and notifying both the operator and the enforcement authority of a violation. The information which supports this activity comes from the permit schedule and conditions, the operator self-monitoring report and the inspection report. Specific items of information include:

- Compliance schedule
- Permit conditions such as volume of fluids and injection pressures
- Inspection findings such as mechanical integrity test results
- Operator reported pressures and volumes for a reporting period.

This information enables the program administrator to determine whether or not an operator is in compliance with the conditions of his permit and the existing regulations.

. Compile and Maintain Inventory

This activity is required at the outset of the program and is ongoing thereafter. The development of the initial inventory consists of compiling active permits and recording the operator identification, location and status information. It also requires compiling archival information concerning abandoned and plugged wells and attempting to obtain as complete an inventory as possible with the information available. The ongoing inventory activity consists of periodically adjusting the existing inventory. The information which supports this activity comes from the Permittee file, plugged well permit applications or notifications, inspection findings, and historical well records. Specific items of information include:

- Status of inspection operation
- Well operation identification and location
- Identification of plugged or abandoned wells with location information.

This information allows the program administrator to maintain a current injection well inventory of all facilities within the State.

. Enforcement Action

This activity consists of determining a course of action based upon the type and severity of an identified violation. It also involves initiating the specified action, scheduling events, and tracking the action to completion. The information which supports this activity includes compliance screening, inspection reports, and the prescribed enforcement response. The data includes:

- Violation detected
- Indicated action
- Action date
- Action status
- Action timetable.

This information allows the program administrator to analyze the effectiveness of enforcement actions and determine priorities for enforcement activity.

(2) Monitoring Region

The role of the Region in the UIC program may be twofold. For those designated States which do not choose to take primacy, the Region becomes the program administrator. In the case of those States which accept primacy the Region functions as the program monitor. Exhibit II-3 depicts the activities and supporting information requirements of a monitoring Region.

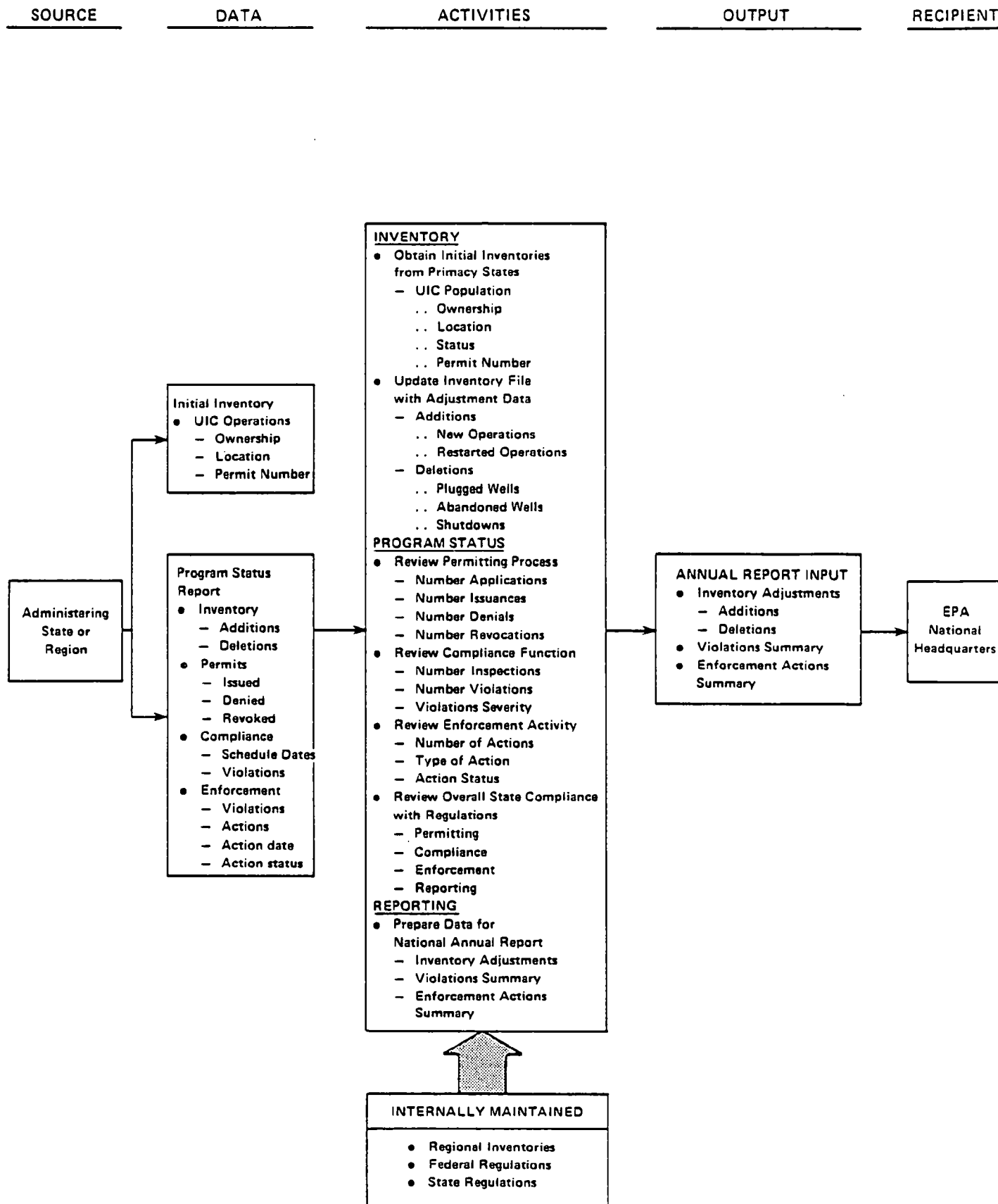
The objective of the monitoring region is to assure that the administering State is in compliance with the Federal regulations governing the UIC program. To accomplish this objective the Region requires that the State periodically submit program status reports. These reports contain the information which the Region needs to analyze the effectiveness of the State program. This information is in the form of summary data compiled by the State. The information supports the activities of inventory adjustment and overall program monitoring.

. Inventory Adjustment

This activity consists of updating the Regional injection well inventory with periodic input from the administering States. The information required is on the program status report and includes:

- Additions in the form of new operations or restarted operations

UNDERGROUND INJECTION CONTROL PROGRAM INFORMATION REQUIREMENTS AND PROCESSING FLOW PROGRAM MONITORING REGION



- Deletions including plugged and abandoned wells.

Program Monitoring

This activity consists of a complete review and analysis of the information provided in the periodic program status report submitted by the States. The information analyzed includes:

- Number of permits issued, denied, or revoked
- Summary of violations
- Summary of enforcement activity.

This information enables the Region to identify areas where States are not in compliance with the regulations and to take steps to correct, to identify trends and set regional priorities, and to measure the overall effectiveness of the State programs.

(3) National Headquarters

The role of EPA National headquarters in the UIC program is one of management authority and provider of information to Congress and other Federal agencies, as well as to special interest groups and the general public. Headquarters will coordinate all information received from the Regions and States which satisfy the Federal reporting requirement of the regulations. Through analysis and report preparation, Headquarters will perform its National oversight function and inform the public. Analyses include assessment of regulations effectiveness, national trends in underground injection techniques, and effects of new inspection or other monitoring techniques.

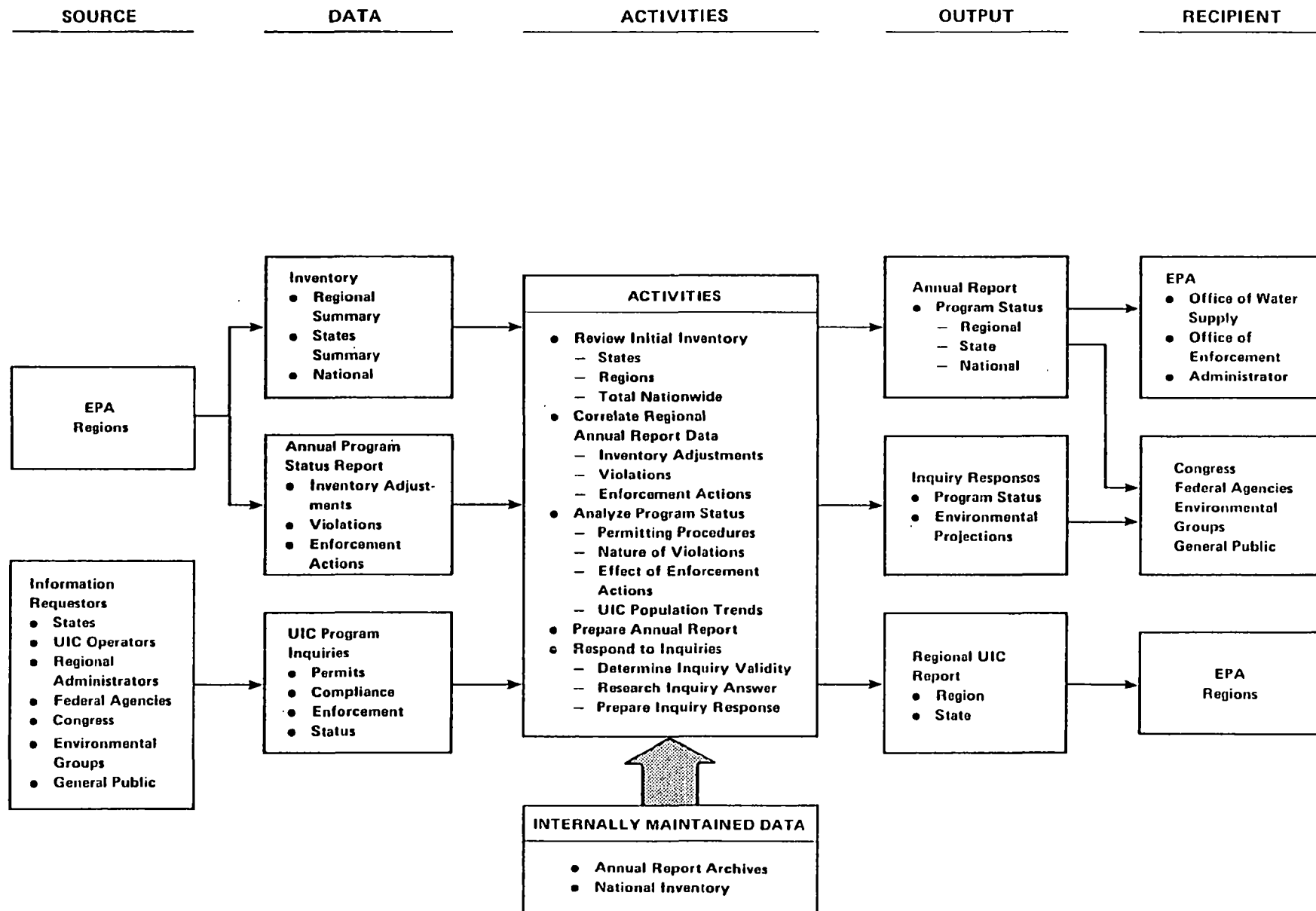
Exhibit II-4 shows the activities and supporting information requirements of National Headquarters. The activities include monitoring of the UIC program on a national basis and responding to inquiries.

Program monitoring

This activity consists of correlating and analyzing the annual report information provide by the Regions and States. Information required to accomplish this activity includes:

- Summary of violations
- Summary of enforcement actions

UNDERGROUND INJECTION CONTROL PROGRAM INFORMATION REQUIREMENTS AND PROCESSING FLOW EPA NATIONAL HEADQUARTERS



- Summary of permit activity
- Inventory adjustments.

. Respond to Inquiries

This activity consists of responding to inquiries from various sources by determining the validity of the request, researching the answer and preparing a response. The information which supports this activity includes all available detail and summary data which resides at the State, Region or national level.

3. ISSUES AFFECTING UIC PROGRAM DATA MANAGEMENT

The objective of this study is to design a system concept to manage the data in the UIC program. The system is directed toward meeting the information requirements of the administering entities, whether State or EPA Region. An analysis of the information requirements defined and the complex operating environment leads to the identification of issues which have an impact on the system concept. Issues identified are:

- . Multiple agency administration
- . Jurisdiction of surface impoundments
- . Evolving regulatory environment.

Each of these issues is briefly discussed in the paragraphs which follow.

(1) Multiple Agency Administration

This issue is one which affects those States which are authorized to administer the program (primacy), and whose program administration involves more than one State agency. EPA regulations require periodic reporting of UIC information and basic recordkeeping. The multi-agency structure complicates compliance with the reporting requirements. Some aggregation of data from the different agencies must be accomplished to produce the required reports. This can be a complex, expensive effort if data formats are different or levels of detail vary. Further, responding to Federal queries, the State may also have to perform an aggregation of data from different organizations. This significantly affects State resources and the timeliness of the response. For State operations, this multi-agency environment may also result in less than effective control due to more complex communication requirements and potentially incompatible data bases.

The simplest solution would be to locate the UIC program, or possibly the responsibility for all UIC data, in one State organization. However, this may not be feasible in many States. As a result, much care must be exercised to develop procedures which will assure effective control and permit sufficient response to Federal regulations. At a minimum, EPA has encouraged the States to designate a single point of contact for the Agency.

(2) Jurisdiction of Surface Impoundments

An issue which affects both EPA and the States is the role of surface impoundments as it relates to the UIC program. Originally pits, ponds, and lagoons which make up the surface impoundments were believed to be under the jurisdiction of the UIC program. However, there are two sections of the Resource Conservation and Recovering Act (RCRA) which also relate to some types of surface impoundments. A study is being conducted by the Office of Drinking Water, in conjunction with the States, to better define the issues. The purposes of the study include: development of national data on the number, location, and construction of impoundments in existence; evaluation of the pollution potential; obtaining information regarding existing State control programs; and solicitation of State recommendations for a program to protect ground water from contamination by surface impoundments.

Only after completion of the study would a decision be made as to whether (or which portions of) the surface impoundments will be controlled under RCRA or the Safe Drinking Water Act. Since there is a possibility that control of some of the surface impoundments may be included in the UIC program, the system must be designed with the flexibility to facilitate this circumstance, should the need arise.

(3) Evolving Regulatory Environment

The underground injection control is an emerging Federal program. As such it is guided by sections of the Safe Drinking Water Act for which regulations are still under development. The results of this situation are:

- . Forms, and therefore the specific contents, have not been developed for the Federal permits and self monitoring reports
- . Enforcement requirements are not firm, including the means for assessing the degree or severity of non-compliance
- . The roles which specific states will assume is not established
- . The identification of designated states is not yet complete.

The implications of this environment for the UIC management information system include both the configuration of the software and the implementation strategy.

In terms of the system configuration, an enforcement function has been defined for administration of the program. Contacts with enforcement organizations in EPA have revealed that the program is too young to permit specification of detailed requirements. Classic enforcement activities such as analysis of self-monitoring reports against performance criteria, and analysis of inspection reports have been identified as applicable to the UIC program. However, until the data elements to be included on the Federal permit are defined, and until experts in the UIC program have agreed upon other compliance measures, the specific criteria for assessing non-compliance cannot be established. This information, although not essential for development of a system concept, is necessary for detail system design.

The expected volume of activity and who will perform it, are factors in determining how the system will be implemented, and indeed, even in selecting among alternative system concepts. For example, if the majority of designated states were to assume primacy using their own automated systems, the volume of data to be handled by the EPA system would be much less than if many states chose to use the EPA system and/or Region for program administration. The mix cannot be established even through review of state system capabilities because many states are waiting until the regulations are promulgated before deciding on a role.

The implications of the emerging program environment are included in the analysis of alternatives and implementation strategies presented in Chapters III and IV. In some instances of such early programs, an interim software capability, or an interim or phased implementation strategy is adopted. These alternatives will be considered for the UIC program.

4. EVALUATION CRITERIA

In evaluating alternative system concepts there are two types of criteria which are generally considered: effectiveness and cost. The cost analysis of the alternative concepts is presented in Chapter IV. The effectiveness criteria are based on the defined requirements and so are described here. Evaluation criteria identified for the UIC management information system are:

- . Minimize the manual burden imposed by the system
- . Strength of error and accuracy controls
- . Skill levels required to operate and maintain

- . The ability to respond promptly to recurring and ad hoc reporting requirements
- . The ability to handle changing, complex analysis requirements in support of enforcement and programmatic needs.

Each of the alternatives described in Chapter III will be evaluated in terms of these criteria. This evaluation, together with the cost analyses in Chapter IV, will provide information from which a recommendation will emerge. Each of these criteria is discussed in the paragraphs which follow.

(1) Minimize the Manual Burden Imposed by the System

For designated states accepting primacy and for Regions administering one or more non-primacy States, a significant paper processing workload is anticipated. Input to the program includes permit applications, self-monitoring reports, and inspection reports. Manual approaches can be quickly overloaded with large amounts of data. Similarly, attempts to relate different types of incoming data manually will fail if the volumes of data are significant. The evaluation criterion is the ability of the system to respond within the limited levels of manpower available in EPA and the States, and within the time required to handle system inputs and file updates.

(2) Error and Accuracy Control

Manual information systems can be highly accurate if effective procedures are implemented, and if the volume of data handled is sufficiently small that the procedures are feasible. When the data volume expands, automated assistance, including automated edit functions, is typically required to assure accuracy of the data base. However, this is only one discussion of this criterion. The other aspects are the degree to which the system design provides internal control and the degree to which the system facilitates maintain data.

(3) Skill Levels Required to Operate and Maintain the System

Although, in general, it is desirable to design as much capability as possible in the system, this must be balanced by accompanying maintenance requirements. State and Regional staffs are usually limited in number and skilled ADP and program personnel are at a premium. As a result, maintenance must be minimal in terms of volume and complexity. Similarly, a complex system requires more skill on the part of users which can negatively affect the effective response to new requirements. As a result, the alternatives must be evaluated as to their simplicity and hence maintainability in the State and EPA Regional environments.

(4) Ability to Respond Promptly to Recurring and Ad Hoc Reporting Requirements

An important objective of most management information systems is to provide useful reports on a timely basis. To serve as an effective management tool, the UIC system must be able to produce such reports as activity summaries, exception reports, schedules and inventories which are accurate and current. Although these reports can be produced manually, as the volume of data increases the feasibility of producing timely reports quickly disappears. In particular, exception reports are generally a feature of an automated capability which can scan a large volume of data quickly to identify the exceptions. The alternative system concepts will be evaluated in terms of their ability to provide effective reporting with a primary emphasis on exception reporting.

(5) Ability to Handle Complex Analyses

The significant analysis capability was identified in the UIC program functional requirements. These included tracking enforcement actions and evaluating program effectiveness. Both of these requirements are driven by parameters, developed by UIC program staff, which change under the focus and direction of current program initiations. The staff requires flexible, powerful capabilities in managing the direction of the program and in helping to apply proper priorities in program management. Although these capabilities are more in the realm of desirable features than necessities, they serve as appropriate evaluation criteria. The ability of the alternative to effectively provide these capabilities can be an impartial determinant between two alternatives which are otherwise equivalent.

Having identified the information requirements, the major issues, and the evaluation criteria, we are now ready to define the feasible alternative system concepts which will satisfy the data management function of the UIC program activity. These are addressed in the next chapter.

III. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE SYSTEM CONCEPTS

III. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE SYSTEM CONCEPTS

In this chapter, system design alternatives for a UIC management information system are presented. The alternatives focus on the different degrees of automation possible for the program administration function performed by a Region for a non-primacy State, or by a State with primacy. Four alternatives are described, the first being an entirely manual system. The other three alternatives reflect increasing levels of automated capability. For each alternative, a description of the major activities, and the advantages and disadvantages of the concept are described. Estimated costs for each alternative are provided in Chapter IV.

In addition to the system design alternatives, system implementation alternatives have been identified and are described in Section 6 of this chapter. The system implementation alternatives consider whether EPA should implement a distributed version of the UIC Information System or support a simpler, centralized approach.

1. UIC MANAGEMENT INFORMATION SYSTEM ACTIVITIES

Based upon the requirements presented in the previous chapter, we formed a functional description of the Underground Injection Control information system. This functional description, presented in Exhibit III-1, aligns the basic input, output and activities which any UIC system must support. This functional description will be used as the basis for the discussionable alternatives in that each alternative would successfully automate different activities of the UIC description.

Each of the activities requiring support by an Underground Injection Control Information system are described briefly below:

- Track Permit Applications and Maintain Permits

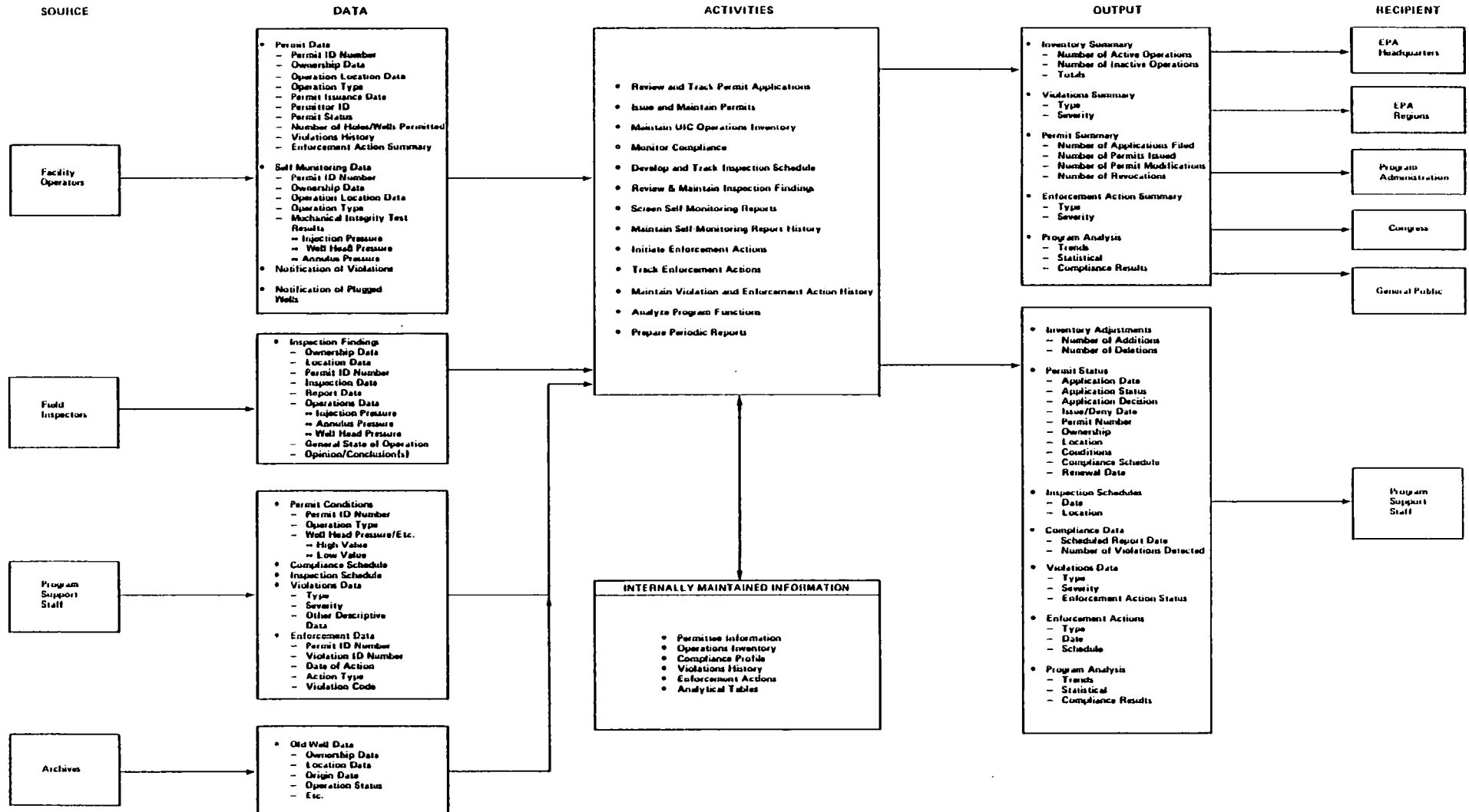
The system should provide assistance to the administrative authority in tracking the status of permit applications from mailing of the application through permit issuance; development of the permit file upon issuance of the permit; maintenance of this data as programmed.

- Maintain UIC Operations Inventory

UIC systems maintain an inventory of all underground injection operations, either by well or facility depending upon the nature of the operating permit. This inventory must include not only the existing underground injection operations but also those which are no longer active.

UNDERGROUND INJECTION CONTROL INFORMATION SYSTEM

PRELIMINARY FUNCTIONAL DESCRIPTION



- . Develop and Track Inspection Schedule

To assist in assuring that all operations are periodically inspected, an inspection schedule tracking capability will be included. Based on an inspection frequency input to the system, an exception report of operations not inspected within the pre-determined time will be produced on request. In this way management is provided a tool for checking to see that no operation needing to be inspected has been overlooked. This would be an optional capability, utilized at management's discretion.

- . Screen and Maintain Inspection Findings

This would support the permit administrator by maintaining a file of inspection reports for historical purposes and also to initiate actions as required as a result of the inspection.

- . Screen and Maintain Self-Monitoring Reports

Operators will be required to submit self-monitoring reports on a regular basis. The system should assist in screening those reports for basic data errors and also for compliance with permit conditions. The system should also maintain a history of these reports for compliance analysis for enforcement purposes.

- . Initiate and Track Enforcement Actions

The UIC system should support enforcement activities by the logging and tracking of enforcement actions against operators. This is both for internal scheduling and tracking by enforcement and also to maintain enforcement history actions regarding operations.

- . Analyze Program Effectiveness

This is a capability activity in terms of the UIC system in that it requires the ability to statistically and analytically assess the program information received from each of the other system activities.

- . Prepare Periodic Reports and Respond to Special Inquiries

This activity is also one of capability in that the UIC system should provide the ability to produce the various periodic reports required by EPA and should also provide the capability of responding to special inquiries from EPA, Congress, program administration and others.

In the next sections we will present a series of alternatives with increasing levels of automation with each of these activities. A brief description of how that alternative will handle each activity will be described in that section. For the recommended alternative these activity descriptions are developed in greater detail in Chapter V.

2. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE 1

The characteristics of UIC system Alternative 1 are shown in Exhibit III-2. Alternative I is a manual system with no automated capability. It is characterized by:

- . System management decentralized at each agency
- . Manually prepare management reports
- . Hard copy files
- . Manual procedures.

Descriptions of the activities, management, advantages, and disadvantages of the alternative system concept follow.

(1) Major Activities

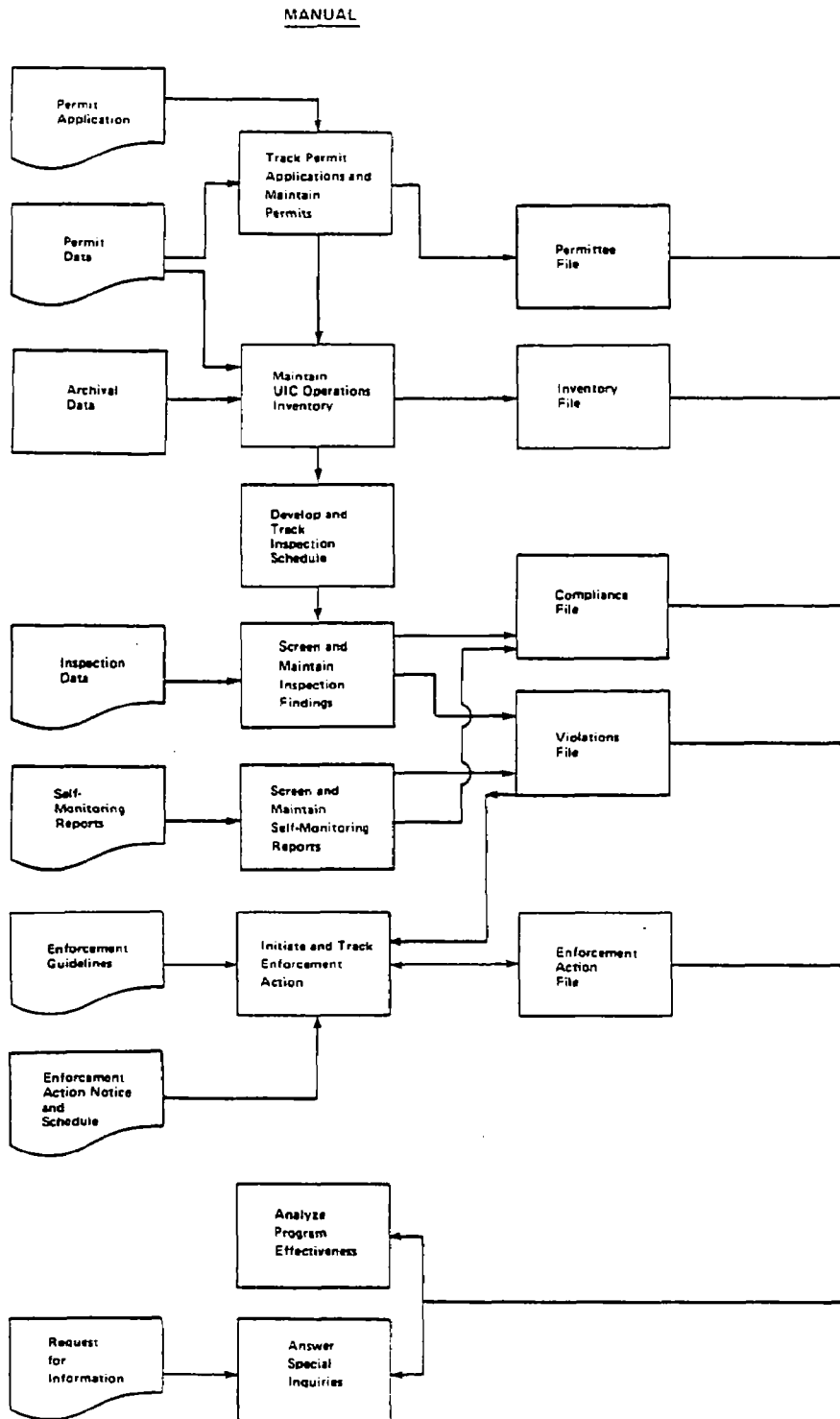
The major activities of Alternative I are performed manually. These system activities are described below.

. Track Permit Applications and Maintain Permits

Permit applications will be sent to those underground injection facility operators that do not have a permit. A record is maintained of each outstanding application. This record includes the date it was sent, to whom it was sent, and the date it is due. Periodically, the application records are screened to identify delinquent applications. The applicant is notified that his application is overdue. A report identifying delinquent applications is prepared.

When an application is submitted, it is checked first for data correctness and, secondly, for adherence to both State and Federal regulations and/or standards. The application is then reviewed for technical and administrative qualifications. During this approval process, the status of each permit application is tracked up to the point of permit issuance. Once a permit is approved and issued, permit conditions, operation ownership and location, and other permit data are recorded onto the application record which now becomes the Permittee file. As the permit is modified, the Permittee file is updated.

UIC INFORMATION SYSTEM DESIGN ALTERNATIVE 1



- System Management
 - Decentralized at Each Agency
- Management Reporting
 - Manual Status
 - Manual Inquiries
 - Manual Analyses
- Data Management
 - Manual Files
- Processor
 - Manual



• Automated for First Time

- . Maintain UIC Operations Inventory

The UIC regulations being developed by EPA require that each state which is authorized to administer the UIC program must compile and maintain an inventory of all wells and holes (both injection and non-injection) which may be affected by underground injection activity within its borders. Compilation of this inventory involves creating an inventory record for each underground injection operation. This is accomplished by posting relevant permit information to the inventory record for activities which are granted permits and for those facilities which already have permits. For facilities which are already permitted, the inventory maintenance staff may have to access archives in order to obtain relevant inventory information. In addition to creating inventory records, this activity also involves updating existing records. This occurs when the status of an injection operation changes. These changes may result from permit modifications, notification of plugging, and permit suspension or revocation.

- . Develop and Track Inspection Schedule

Given the projected annual inspection capacity, the number of underground injection operations, and inspection priorities and/or frequencies, an inspection schedule will be developed for each participating organization's field inspection staff. As priorities change and actual inspection capacities vary, the schedule is adjusted. The schedule will also be adjusted when specific requests for inspection are received. The inspection schedule will identify the scheduled date, the assigned inspector and the inspection report due date. By periodically scanning the schedule, the inspection supervisor can track upcoming inspection, inspection reports due and overdue, and can in general monitor the inspection activity. Periodically the inspection staff will prepare an Inspection Program Assessment Report.

- . Screen and Maintain Inspection Findings

In performing field inspections, the permitted conditions of an operation are tested via integrity tests and results are reported. Subsequently, the inspection findings are reviewed and violation(s) are recorded into a Violations and Compliance record. Subsequently, when a facility operator notifies the program support staff that corrective action has been taken, the correction status information within the Compliance and Violation records is adjusted to reflect the corrective action. This occurs when the notification is received and provides for up-to-date Compliance and Violation records.

- . Screen and Maintain Self-Monitoring Reports

The UIC regulations being developed by EPA state that all permitted underground injection operations must periodically report operational compliance to the programs administrator. This is done through use of a self-monitoring report. Each operator monitors and completes a report detailing the monitoring results in terms of pressure and volume readings. These reports are then submitted to the program support staff where they are screened against permit conditions to identify violations. Upon detection of a violation, a Violation and Compliance record is initiated by the program support staff. When the operator notifies the programs administrator that corrective action has been taken, the Violation and Compliance record is updated.

- . Initiate and Track Enforcement Actions

Enforcement actions are determined by extracting violation information from the Violation and Compliance record and using enforcement guidelines to identify the appropriate enforcement actions. These actions are based on the type and severity of the violation.

Once enforcement actions are determined, enforcement action records are initiated by the enforcement staff. These records identify the violator, describe the action, identify the action initiation date, the schedule of events required to complete the action, and the status of the action. As enforcement actions are determined, enforcement action notices and action resolution date schedules are prepared. The action notices are mailed or delivered to offending operators. Schedules are prepared and obligatory operator responses and required enforcement events are tracked. Upon enforcement action resolution, the enforcement action record is adjusted with enforcement action status information. Periodically the enforcement staff will prepare an Activity report which details all current enforcement activity.

- . Analyze Program Effectiveness

Periodically the effectiveness of the UIC program will be measured. This is done by identifying program areas such as inventory, compliance, and enforcement action, and performing both trend and effectiveness analyses. Through these individual functional analyses, overall program effectiveness can be ascertained. The mechanism for this analytical activity is analytical tables which are developed by the program analysts. These tables include formulas and statistical factors derived from such elements as program and function goals, objectives and priorities.

. Answer Special Inquiries

Periodically the programs administrator will receive requests for information about the program. This information can pertain to any aspect of the program. These requests are unique in that they cannot be answered through existing reporting mechanisms. It will therefore be necessary to search existing data files, and then compile, format, and present the information to the requestor.

(2) Systems Management

The systems management for Alternative I will be decentralized within each affected State administering agency, or the EPA region which administers the program.

(3) Management Reporting

Management information reports, responses to special inquiries and analysis reports will be prepared manually. Reporting frequencies will be quarterly for management information reports, and annually for analysis reports. Additionally, special information requests will be responded to as they are received.

(4) Data Management

The data management used by Alternative I will be manual data files. These files will include the following information:

- . Permittee Information - including operator, owner, location, permit conditions and scheduled milestones where appropriate.
- . Operations Inventory - including information on ownership, location, contact, classification and permit status.
- . Compliance History - including information on violations, conditions violated, permitted values, and actual values.
- . Violations History - including information on violation type, severity, date, correction status, detection mechanism, and enforcement action.
- . Enforcement Action - including information on action type, action date, action manager, action schedule, and action status.

(5) Summary of Alternative I

This manual system alternative could be integrated into State or Regional operations with little or no change to staff

skill mix, since skill levels required are consistent with current staffing. However, there is definitely a limit to the workload which could be handled by the system. Estimated workloads suggest that only a State having very little UIC activity or whose activities are dispersed over many agencies could handle the entire program manually. In addition, the manual data manipulation can result in high error rates and low confidence in data accuracy. The system represents a labor intensive capability for producing reports and complex analyses. Again, depending upon workload, the ability to respond to ad hoc information requests rapidly is very limited.

3. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE II

Exhibit III-3 depicts the level of automation and characteristics of UIC system Alternative II. The second UIC system alternative provides basic automated support for several of the major activities. The automated features of Alternative II include permit application tracking and permit maintenance and UIC Operations Inventory maintenance.

(1) Level of Automation of Major Activities

The following paragraphs describe the automation defined by this alternative.

. Track Permit Applications and Maintain Permits

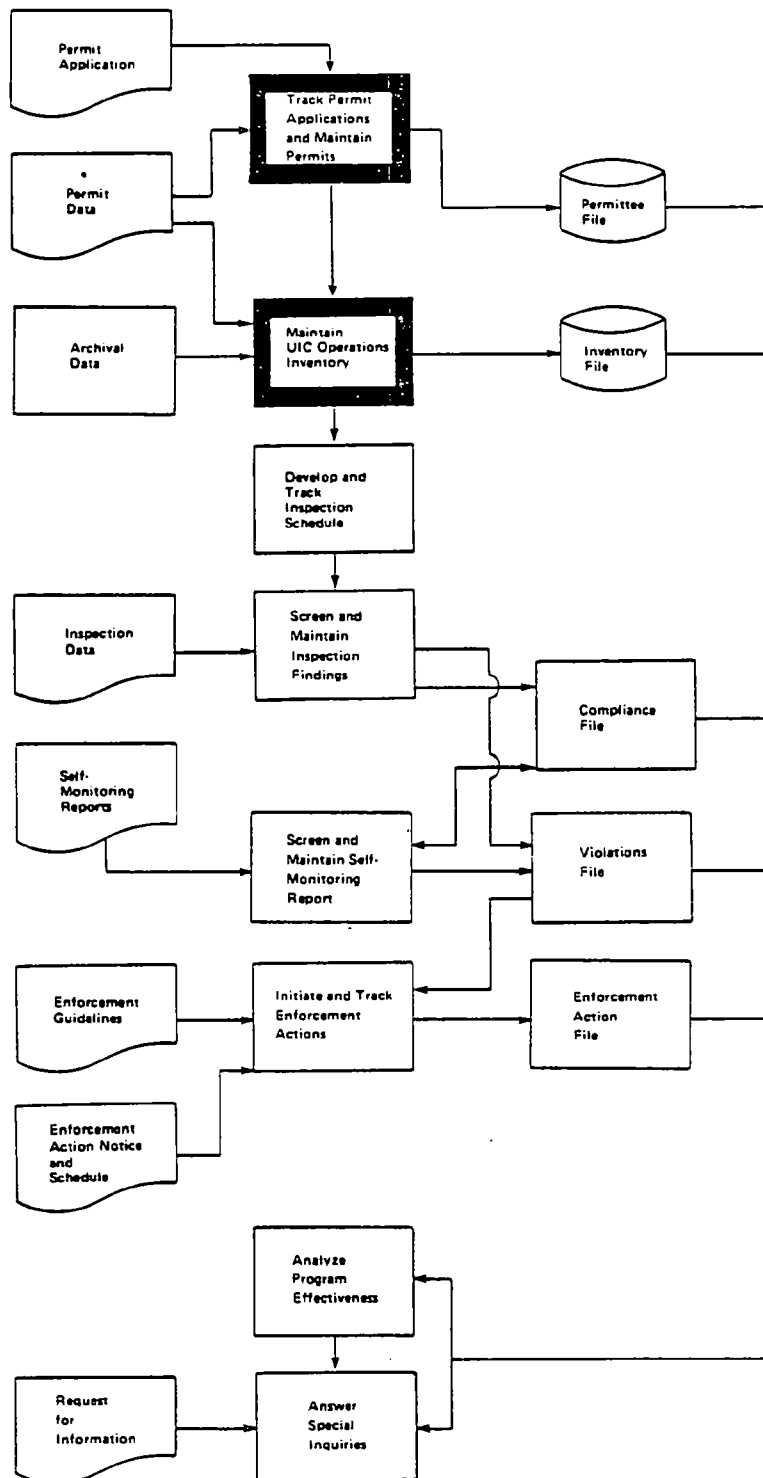
Certain aspects of this activity have been automated under Alternative II. When an application is sent to a facility operator the basic information will be key batched into the computer to create a permit applicant record. This information includes:

- State and Federal Region Code
- Applicant Name
- Date of Application
- Application Due Date
- Application Status.

Periodically this file will be scanned and an exception report listing overdue applications will be generated. When an application is received, the status is set to "received." This will occur during a periodic Applicant File update run. When the application is reviewed and approved, the basic applicant data is modified and the data from the issued permit is added thus creating the Permittee File. Permit information which is added includes:

UIC INFORMATION SYSTEM DESIGN ALTERNATIVE 2

LEVEL OF AUTOMATION



- System Management
 - Decentralized
- Management Reporting
 - Batch Status
 - Manual Inquiries
 - Manual Analyses
- Data Management
 - Conventional Files
- Processor
 - Single State Processor or
 - Individual Agency Processor



Automated for First Time

- Permit Number
- Ownership/Operator
- Operation Classification
- Location
- Conditions
- Schedule
- Receiver Formation Data.

The Permittee File is updated periodically when modifications to existing permits are effected.

. Maintain UIC Operations Inventory

As a by-product of the creation of the Permittee record, the automated system will spin off a UIC Operations Inventory record. The inventory data will be a subset of the Permittee data. This information includes:

- State and Federal Region Code
- Operation Identification
- Operation Classification
- Operation Location
- Operating Permit Basis
- Number of Wells
- Operation Status
- Date of Permit
- Date of Inventory.

These inventory records apply to those facilities which will receive permits when the program commences. For those facilities that already have permits or are inactive at program onset, the required inventory information must be obtained through available archival information. This data may be compiled manually and key batched into the system, or it may be in machine readable format provided by a contractor, as is the case in some states. This data together with the current data provided by the permitting activity comprise the automated UIC Operations Inventory.

(2) Systems Management

The systems management for Alternative 2 will be decentralized at either the State agency or the EPA Regional office. A single UIC software system will be used. Both the states and the EPA Regions will use this system to maintain data files and generate management reports.

(3) Management Reporting

The primary mechanism used in reporting management information will be batch reports. Batch reports will be generated on a quarterly basis. Analysis reports, special inquiry responses, and certain management information reports still require manual preparation.

(4) Data Management

The data management used by Alternative II will include several automated conventional data files and several manual files. The automated data files will include the following information:

- . Permittee Identification - including operator/owner name, location, phone number.
- . Permit Conditions - including permit basis, permit status, permit criterion and permit renewal date.
- . Operation Information - including operation classification, number of wells and operation status.

(5) Evaluation of Alternative II

This alternative concept provides the capability to handle the permit and inventory maintenance workload, but the self-monitoring reports are still processed manually. The self-monitoring reports represent the largest volume of one type of input and have a significant impact on manpower requirements. Accuracy of permit and inventory data can be high, but reports based on compliance data are limited by manual error rates. Since an automated capability is being provided, some facility in using the system would have to be developed if the State/Region does not already have the staff with these skills. However, the system is quite straightforward, requiring only minimal capability in this area. The alternative represents an effective capability to respond to reporting requirements regarding permits and operations inventory but inspection scheduling, compliance monitoring and complex analyses are limited by manual capabilities.

4. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE III

Exhibit III-4 shows the level of automation and characteristics of UIC system Alternative III. This alternative provides automated scheduling, compliance and reporting capability in addition to the previously automated capability of Alternative II. The automated features of this alternative include inspection scheduling and tracking, operator compliance monitoring and automated report preparation.

(1) Levels of Automation of Major Activities

The following paragraphs describe the automation defined by this alternative:

. Develop and Track Inspection Schedule

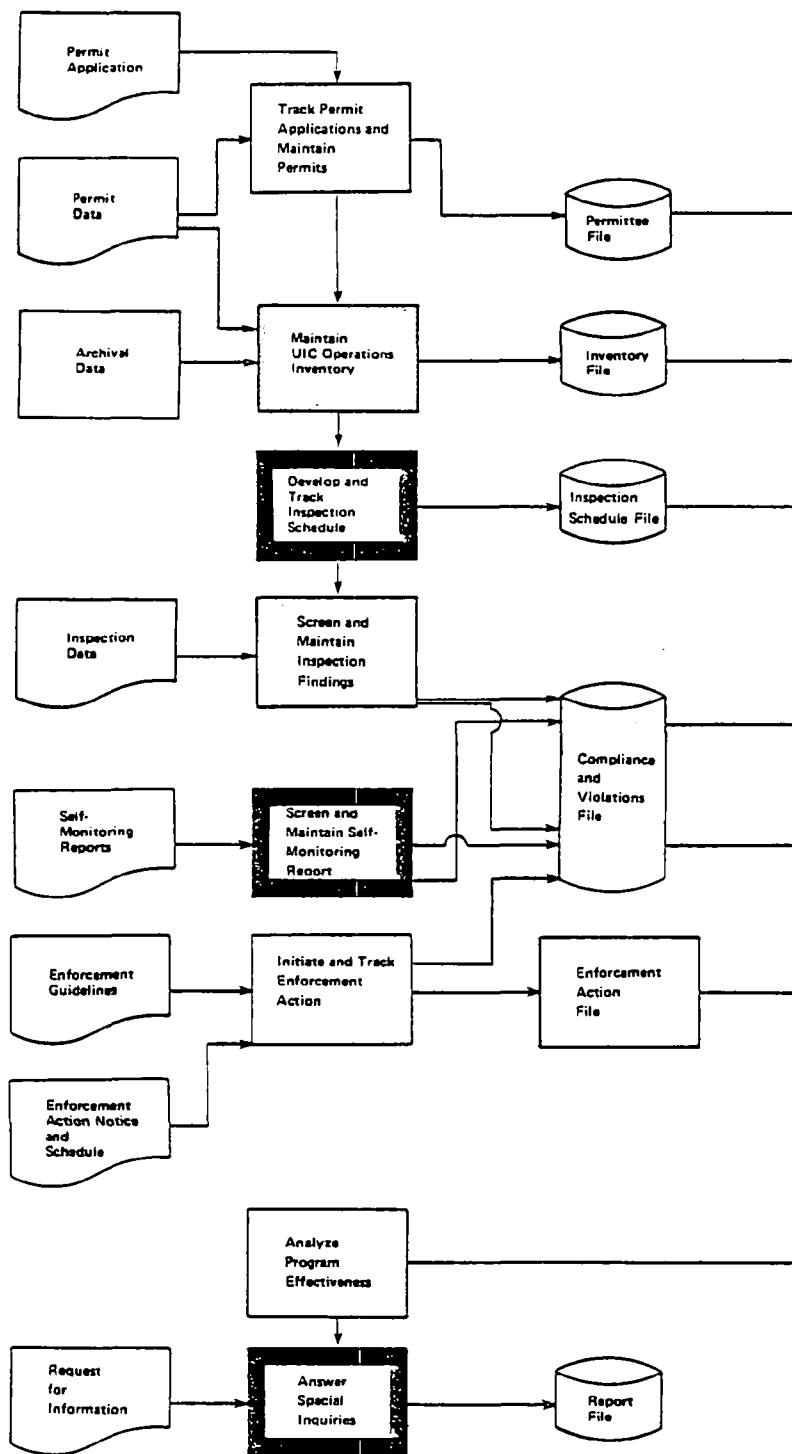
This activity will be automated in this and all following alternatives. Program support staff will supply estimated average inspection time and existing inspection priorities. This information will be key-batched and entered into the system. Using this data the system will develop an inspection date and status for each operation. The inspection schedule data will be maintained on an automated file. This file will be read on a quarterly basis with the compliance data file and the inspection status field will be checked. Those inspections overdue will be identified and the system will generate a report to management which details the overdue inspections. This activity will be flexible enough to add unscheduled but requested inspections to the Inspection Schedule data file.

. Screen and Maintain Self-Monitoring Reports

This activity will be automated in this and all following alternatives. Facility operators will be required to periodically submit self-monitoring reports to program support staff. The frequency of this submission will be quarterly, and each self-monitoring report will cover one month's monitoring activity. The individual monthly self-monitoring reports will be key-batched and entered into the system. These self-monitoring transactions will be stored in a temporary file and the Permittee File will be accessed. The self-monitoring report transactions will be compared to the permit conditions and previous reports of that operator and exception reports will be produced. This will assist in identification of non-compliance with the permit or other problems. When a case of non-compliance is identified, the system will create a Violations and Compliance record. This record is tied back to the permittee and become part of the Violations and Compliance data file. The system at the conclusion of the processing run will generate reports for

UIC INFORMATION SYSTEM DESIGN ALTERNATIVE 3

LEVEL OF AUTOMATION



- System Management
 - Decentralized
 - Centralized
- Management Reporting
 - Batch Status
 - Batch Inquiries
 - Manual Analyses
- Data Management
 - Centralized
 - .. Conventional Files
 - .. DBMS
 - Decentralized
 - .. Conventional Files
- Processor
 - Centralized
 - .. EPA Processor (NCC or WCC)
 - Decentralized
 - .. Single State Processor or
 - .. Individual Agency Processor



Automated for First Time

management including a Violations Report and a Compliance Report.

- . Answer Special Inquiries

This activity will be automated in this and all following alternatives. Based upon a sample of special inquiries that have been requested, a module will be developed that can handle a limited number of anticipated inquiries. The special inquiry request will be key-batched into the system in a parametric structure, where each set of parameters will drive the routine that will respond to the particular inquiry. This module will access system data files in order to be responsive to the requesting party.

- (2) Systems Management

The systems management for Alternative III will remain the same as the previous alternative.

- (3) Management Reporting

This alternative provides additional automated generation of management reports. These reports will be produced in a batch processing environment. These reports now include the activities of inspection and compliance monitoring. Additionally, this alternative provides batch processing of special inquiries with automated generation of responses. There still remains some manual management report preparation, inquiry response preparation and analysis report preparation.

- (4) Data Management

The number of estimated data files increases in this alternative to include an Inspection Schedule File, and a Violations and Compliance File. Additionally, there is an automated temporary inquiry response file which is a basic print file. These automated files include the following information:

- . Inspection Schedule

Including information on inspection date and inspection status.

- . Violations History

Including information on violator identification, type of violation, severity of violation, violation detection mechanism, and violation correction status.

- . Compliance History

Including information on compliance report date, facility operator, condition out of compliance, permitted value, reported value, and compliance status.

(5) Summary of Alternative III

This alternative provides an automated capability for handling all anticipated input reporting. With automated data handling, error controls should be effective with resulting high confidence levels for data base accuracy. The system is still straightforward, but does require that the staff possess some systems skills. Reporting capabilities include all basic requirements, such as activity summaries, inspection schedules, and exception reports. The system is capable of responding effectively to most ad hoc report requests, but does not possess a sophisticated analytical capability for extended enforcement support or program effectiveness analyses.

5. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE IV

Exhibit III-5 graphically presents the level of automation and characteristics of UIC systems Alternative IV. This alternative provides automated enforcement support capability and program analysis capability in addition to the automated features discussed in the previous alternatives.

(1) Levels of Automation

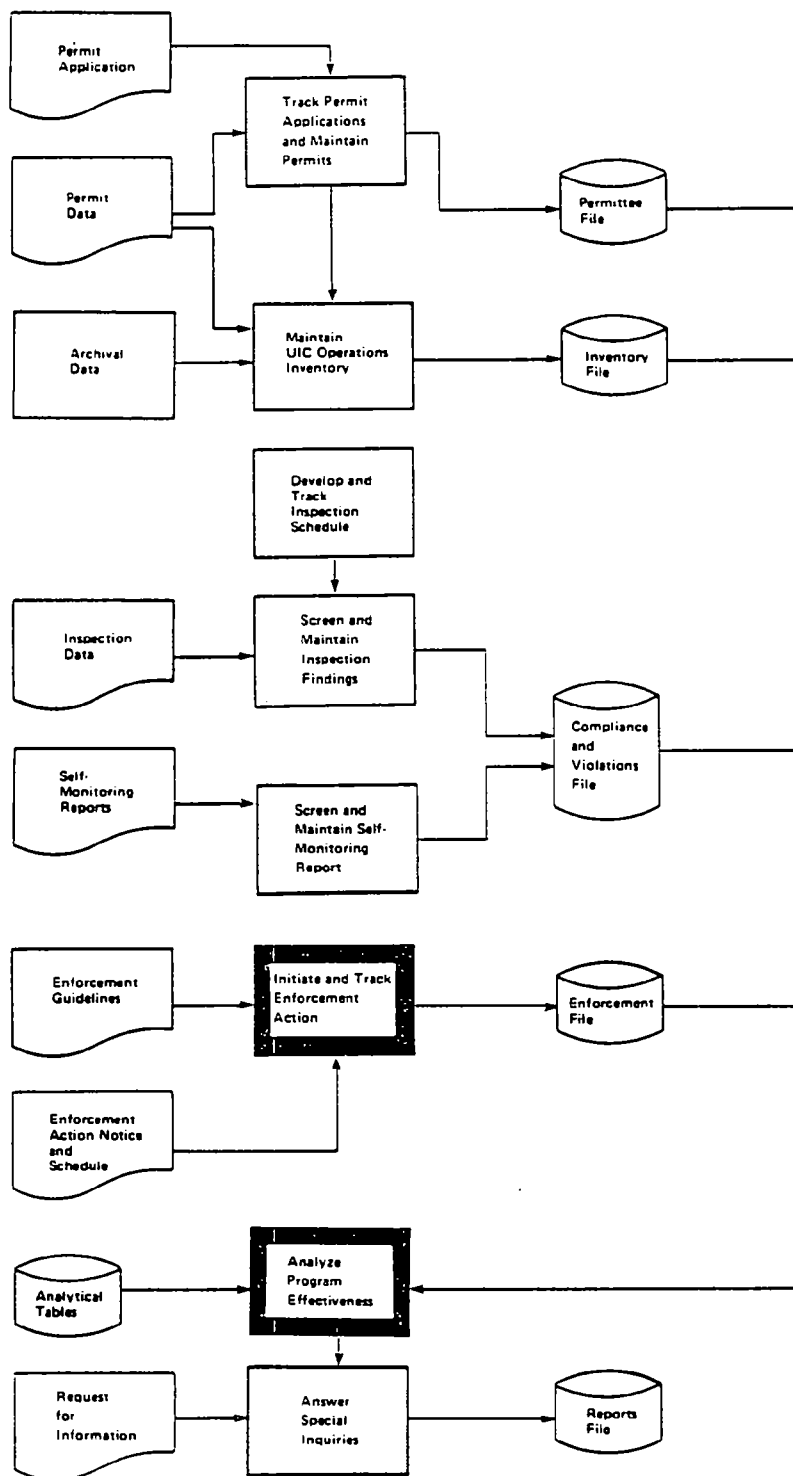
The following paragraphs describe the automation defined by this alternative.

. Initiate and Track Enforcement Action

This activity requires that the enforcement staff key-batch and enter into the system a set of guidelines which identify enforcement actions for certain violations. Once this information is in the system a violation is identified during compliance screening, compared to the enforcement guidelines, and the required enforcement action automatically identified and reported to the enforcement staff. When the enforcement staff initiates this action, they will prepare a notice of enforcement action, the action date, and any corresponding action schedule. This information will be key-batched and entered into the system and an enforcement action history record will be created. The record will carry all the above data and will include a status field. Periodically, the Enforcement Action History File will be read and upcoming events on the action schedule will be reported as reminders to the enforcement staff. Additionally, when an event occurs which alters the action status, this data will be entered into the system and the record modified. The system will generate management reports on a quarterly basis.

UIC INFORMATION SYSTEM DESIGN ALTERNATIVE 4

LEVEL OF AUTOMATION



- System Management
 - Decentralized
 - Centralized
- Management Reporting
 - Batch Status
 - Batch Inquiries
 - Batch Analyses
- Data Management
 - Centralized
 - .. Conventional Files
 - .. DBMS
 - Decentralized
 - .. Conventional Files
- Processor
 - Centralized
 - .. EPA Processor (NCC or WCC)
 - Decentralized
 - .. Single State Processor or
 - .. Individual Agency Processor



• Automated for First Time

. Analyze Program Effectiveness

This activity requires that program analysts develop analytical formulas and factors to permit the system to compute program effectiveness and program trends. The type of analytical formulas and factors is based upon the projected goals and objectives of the overall program and the individual functional activities. This data is supplied by the annual budget process which indicates objectives and goals. The program analysts will take this information and develop their formulas and factors using statistical methods. Once developed, these analytical tools will be key-batched and entered into the system in the form of Analytical Tables. On an annual basis the system will measure program effectiveness by evaluating current figures to date to projected objectives and applying the analytical formulas and factors. Additionally, the system will have the capability to perform trends analyses of the individual functional activities and the overall program. These trends analyses may include geographic trends, classification trends, violation trends, and enforcement trends. The system will automatically generate analysis reports.

(2) System Management

The system management for Alternative IV will remain the same as the previous alternative.

(3) Management Reporting

This alternative provides a slight increase in the automated generation of management reports. These reports include enforcement activity reports and program analysis reports. Except for certain special inquiries the reporting function is now completely automated.

(4) Data Management

With this alternative the number of automated data files is increased to include an Enforcement Action History file. Additionally, there will now exist an automated internal Analytical Table for program analysis. These additional automated files include the following information.

. Enforcement Action History

Includes information on violator, violation, action description, action date, action status, action manager, and action schedule.

. Analytical Tables

Includes the analytical formulas and statistical factors which will be applied in the program analysis activity.

(5) Summary of Alternative IV

This alternative represents the most advanced capability defined. It is designed to handle the total anticipated input with strong error controls, and has the ability to respond to a wide variety of recurring and ad hoc report requests on a timely basis. The system has now become somewhat complex, however, and so will require a corresponding advanced level of system skill to operate and maintain. In particular, effective use of the program effectiveness and enforcement tracking capabilities requires some analytical and systems sophistication on the part of users. The alternative exceeds basic defined system requirements for a UIC management information system.

6. UIC MANAGEMENT INFORMATION SYSTEM - ALTERNATIVE IMPLEMENTATION STRATEGIES

Whereas UIC Information System level of automation alternatives deal with which system functions will be automated, implementation strategy alternatives primarily deal with how and where system functions will be implemented. The decision for EPA is whether or not to offer a distributed environment for the UIC Information System; that is, offer the States a standard system which can operate locally. In the analysis, we attempted to identify the possible relationships for UIC Management that may occur among the States, EPA Regions and EPA Headquarters. These relationships were defined with regard to the following:

- . State Primacy/Non-Primacy
- . Automated State Capability/No Automated Capability
- . State Accepts UIC System/Does Not Accept UIC System.

Exhibit III-6 graphically depicts the relationships that were identified. These relationships include:

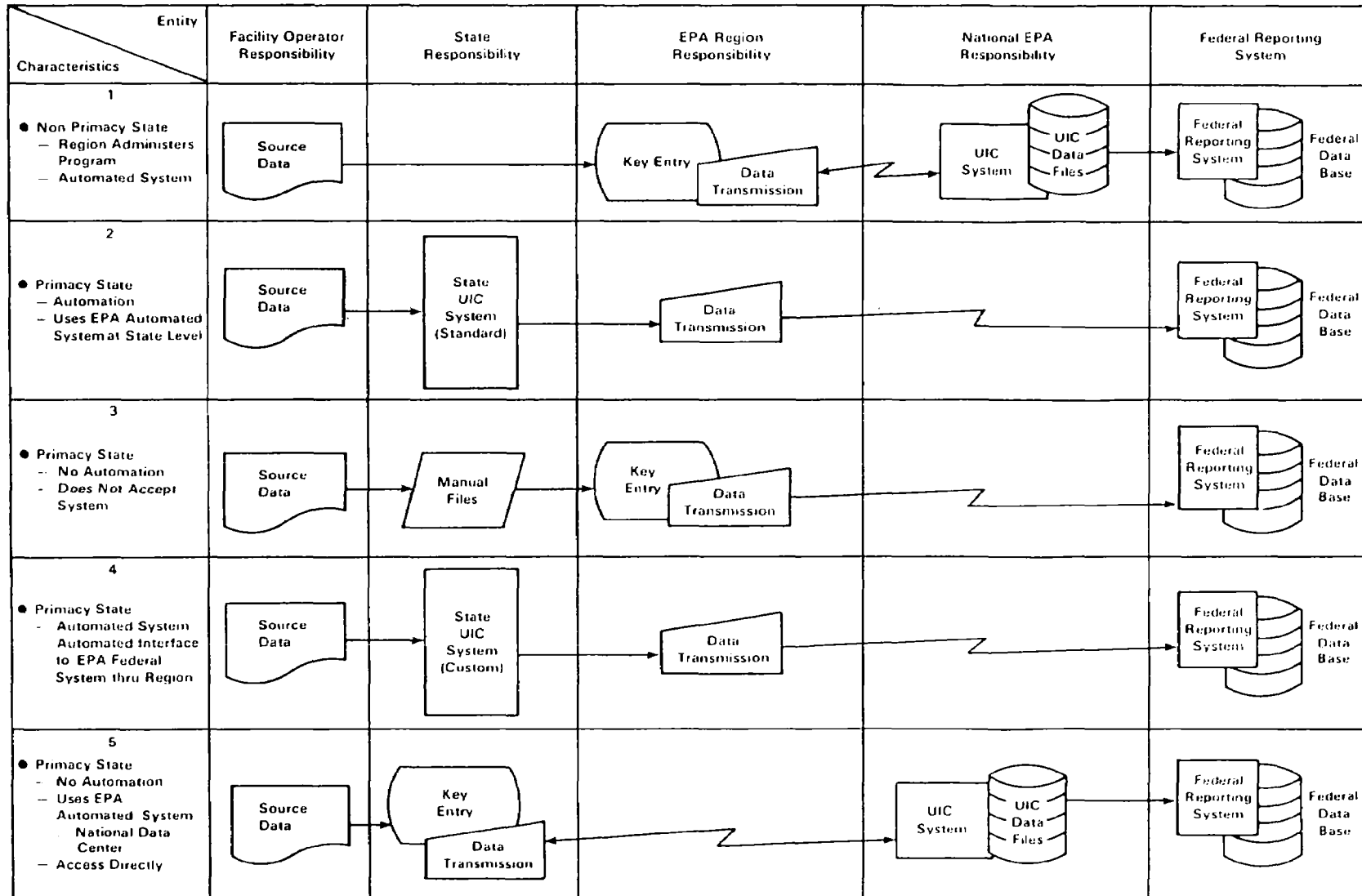
. Case 1: Non-Primacy State

In this case, the EPA Region would be administering the State program and would access the UIC Information System through an EPA national data center.

. Case 2: Primacy State/Automation Capability/Accepts Standard UIC Information System/State facility Implementation

This case represents the situation where the delegated state accepts a standard UIC automated Information System and

UNDERGROUND INJECTION CONTROL SYSTEM PROCESSING CONFIGURATIONS



operates it on State hardware. In this instance, the State would maintain the detail data files and generate a summary data file for transmission to the UIC Federal reporting system.

- Case 3: Primacy State/No Automation/Does Not Accept UIC Information System

A State, having accepted primacy, is required to submit only summary data to EPA to accommodate the federal reporting requirement of the program. Therefore, in this case, the State could periodically present the EPA Region with hard copy summary data which the Region would then key batch and transmit to Headquarters for entry into a Federal Reporting System for UIC information.

- Case 4: Primacy State/Automation Capability/Does Not Accept Standard UIC Information System

In this case, the State would maintain its own customized UIC system. The State automated system would be able to provide summary data for the Federal Reporting System in machine readable format.

- Case 5: Primacy State/Automation Capability/Accepts Standard UIC Information System/EPA Facility Implementation

In this case, the State would have the automated capability to access the UIC Information System and State data through an EPA national data center. The State data base would be accessible only by the State until the State formally releases data to the Federal Reporting System.

These five cases represent the set of possible State-Region-Headquarters relationships which could occur in a distributed environment. There are of course variations of these five cases, for example, the situation where multiple state agencies administer portions of the program and each has automated capability.

Within this framework there are basically two approaches which EPA can take to provide automated assistance to the delegated States. The Agency can make the system available to the States via the State's own telecommunications capability and one of the EPA national data centers, or EPA can support implementation of the UIC Information System in delegated States which request this. The decision, from EPA's perspective, is whether EPA should offer the latter capability. Because EPA must support Case 1, it must offer centralized capability and thus could easily support Case 5. However, to support Case 2, EPA must make an additional investment to develop a distributed capability.

Therefore the two basic approaches are:

Because EPA must support Case 1, it must offer centralized capability and thus could easily support Case 5. However, to support Case 2, EPA must make an additional investment to develop a distributed capability.

Therefore the two basic approaches are:

- . Centralized Processing Approach

Where system software and data bases reside only at a national EPA data center, but are segregated by State.

- . Distributed Processing Configuration

Where system software and data bases reside either nationally or locally at the States depending on the State option.

These alternatives are discussed below.

- (1) Alternative 1 - Centralized Processing Approach

The centralized alternative is characterized by having the UIC Information System software and individual State data bases resident at an EPA national data center, either NCC or WCC.

- . Data Collection and Data Entry

Each State or administering Region would be responsible for collecting and preparing the input data for entry into the UIC Information System. This process consists of transferring raw data onto coding sheets, and batching these input data forms, transformation into machine readable format, and remote transmission to the EPA data center.

- . Data Processing

In the centralized approach the system software would reside at an EPA national data center. Therefore all system processing and data manipulation would occur at the data center, however, the processing and data bases would be segregated by State. System output will be spooled and transmitted to the RJE terminals at the States and Regions where the printed output will be available for program staff. The UIC system is a batch processing system which will provide overnight turnaround.

- . System Interfaces

The UIC Information System will interface with a Federal Reporting System for the national UIC program. The Federal Reporting System would also be resident at the national EPA data center. The UIC Information System would generate

summary data files for each State, once approval by the State, for entry into the Federal Reporting System.

(2) Alternative 2 - Distributed Processing Approach

The distributed processing approach applies to those states which are authorized to administer the UIC program and have automation capability. For those states who prefer their own system, EPA would implement the UIC Information System at State facilities. All State UIC information processing will be performed within the States, either at a single data center, or at individual agency data centers when multiple agencies are involved. This processing alternative is characterized by the data and software residing within the State, with only Federal report data being output from each State to corresponding Regional Offices.

. Data Collection and Preparation

The responsibility for collection and preparation of the input data in the distributed environment will rest with the agency or agencies administering the UIC program. When the processing is done at a central data center within the State, the multiple agencies will forward their data to a central coordination point for batching in preparation for data entry. If processing resides with individual agencies, they will prepare and batch their own data for entry into the system.

. Data Processing

The data processing in the distributed mode will occur at the State level. Within each State, however, the system processing and data manipulation may occur at one or several points, depending upon whether there is a single central data center operation or an individual agency data center operation. Processing would utilize the UIC Information System provided by EPA and maintained by the State.

. System Interfaces

The UIC system will interface with a Federal Reporting System for the national UIC program. The UIC Federal Reporting System will be a centralized system. Therefore, the interface mechanism to the Federal system will be an automated data file which contains the summary level data required by EPA. The media would be magnetic tape which can be submitted to the EPA Region for transmission to the national data center for inclusion in the Federal system.

There are significant cost and operational impacts of the two approaches, both to EPA and the States. These are addressed in Chapter IV.

IV. COST ANALYSIS

IV. COST ANALYSIS

This chapter describes the methodology developed by Arthur Young & Company to perform cost analyses of the alternative Underground Injection Control Information System (UIC) designs proposed to the EPA Office of Drinking Water (ODW), and presents the results of the cost-effectiveness analyses conducted on each of the alternative system concepts. Discussed below are the following topics:

- . General Assumptions - A number of general assumptions applicable to all of the alternatives were made. These assumptions are presented with a brief description of the rationale for their inclusion.
- . Cost Strategy - In order to estimate necessary and relevant costs for evaluating alternative system concepts and alternative implementation strategies, a definition of a cost unit was developed.
- . Cost Matrix - A cost matrix was developed to graphically represent the detailed computations involved in each cost analysis, and to permit evaluation from varying perspectives.
- . Alternative Workload Assumptions - A number of workload assumptions are presented. These are used to develop data entry volumes and file size statistics used in the cost analysis.
- . Alternative Cost Analyses - Each alternative considered for UIC is supported by specific assumptions and the matrix charts delineating the associated costs.
- . Alternative Effectiveness Analysis - Each alternative possesses unique qualitative attributes. In order to highlight these attributes, each alternative was evaluated in terms of its strengths. Consequently, a management impact chart for each alternative system design is presented following the alternative cost analyses.

1. GENERAL ASSUMPTIONS

In order to ensure consistency in the methodology used for the cost-effectiveness analysis of alternative system concepts, a master list of general assumptions was developed. These general assumptions provide a standardized base utilized in the development of cost algorithms for each cost-effectiveness study. In some instances, the nature of certain system alternatives necessitated modification of general assumptions. These modifications, as well as additional components incorporated into the algorithms, are contained in the specific assumptions pertaining to each alternative.

Assumptions regarding system design and development, system implementation, and system operations costs are categorized as personnel resources, computer resources and supplies/other. The General Assumptions are summarized in Exhibit IV-1 on the following page, and explained below.

(1) Assumptions Regarding System Design and Development Costs

- . Personnel Resources - Assumptions related to personnel resources are categorized as costs relative to contractor and EPA personnel. We assumed that contractor personnel will have responsibility for performing all aspects of the UIC system development life cycle (i.e., detailed system design, program specifications, program development, documentation preparation, and system test), while the EPA personnel contribution will be concerned with project management and supervision of all system design and development functions.
- Contractor Personnel - Contractor personnel can be grouped into three major categories, consisting of systems analysts, programmer/analysts, and programmers. Systems analysts are primarily responsible for the detailed systems design, preparation of manuals and related documentation, development of system procedures, and design of user training programs. Personnel in this category are assumed to cost \$15 per hour. Programmer/analysts cost approximately \$12 per hour and are responsible for the training of EPA system users and the development of program specifications as well as providing a portion of their time (25%) to system testing. Also, they are responsible for providing forms design and documentation for the manual system. Programmers who perform the technical functions (i.e., basic programming, testing, etc.) required by the systems are estimated to cost \$10 per hour. Programmers are responsible for the actual program development (writing, testing, debugging, etc.) and the major portion of system testing. These hourly rates include allowances for supervision, fringe benefits, and overhead.
- EPA Personnel - In the following description, all hourly salary rates are calculated using the Federal fringe benefit and overhead factor of 24.4%. As mentioned above, it is assumed that EPA will supervise contractor personnel during the system development life cycle. The EPA Project Officer will be responsible for providing guidance to the contractor, in addition to reviewing and accepting all project deliverables. The amount of project manager participation is assumed to be 25% of the total calendar hours expended by the

ASSUMPTIONS REGARDING SYSTEM DEVELOPMENT AND OPERATIONS COSTS

| Cost Items | Cost Element Components | Assumptions |
|---------------------|--|---|
| Personnel Resources | <ul style="list-style-type: none"> Contractor Personnel | <ul style="list-style-type: none"> Detailed System Design Performed by Contract Systems Analyst – Rate \$15/hour Programming Specifications Developed by Contract Programmer Analyst – Rate \$12/hour Program Development by Contract Programmer – Rate \$10/hour System Testing Performed by Programmer Analyst (25%) and Programmer (75%). (Both Contract Personnel) Manual Procedures/User Training Performed by Contract Systems Analyst Data Conversion and Prototype Operation Performed by Contractor Personnel, Using Programmer Analysts |
| | <ul style="list-style-type: none"> EPA Personnel Training Data Conversion Parallel Operation Data Preparation | <ul style="list-style-type: none"> Project Management by EPA Personnel Will be 25% of the Time Spent by Contract Personnel EPA Rates are: Supervisor – GS 13 - 5 Analyst – GS 11 - 5 Clerk – GS 5 - 3 Fringe Benefits – 24.4% Civil Service Salaries Increase 5%/Annum EPA Performs System Maintenance |
| Computer Resources | <ul style="list-style-type: none"> CPU Time Data Storage Communication Cost for Remote Terminals | <ul style="list-style-type: none"> CPU Time Costs \$932/hour Data Storage Charges are \$50/Month/Disk Pack plus \$5 per Mount Connect Time Cost is \$21/hour |
| Supplies/Others | <ul style="list-style-type: none"> Documents Computer Supplies Travel | <ul style="list-style-type: none"> Reproduction Cost is 5 cents/page Printer paper Cost is 1 cent/page Cards Cost \$12/box of 2000 |

contractor. The hourly rate for the EPA project manager, at the assumed pay grade of GS-13/5, is \$17.63.

- . Computer Resources - Assumptions related to computer resources have been categorized as costs relative to processing time, data storage, and communication costs. For purposes of costing we used the new WCC rates (March 1, 1978) wherever relevant. The Computer Resources section is not applicable to Alternative I - UIC Manual System.
- Processing Time - This variable is computed using the WCC computer usage unit (CUU) algorithm:
$$\# \text{ of CUUs} = 2.3513(\text{CPU Seconds}) + .03462(\text{EXCPS}) + .00135(\text{CPU Seconds})(\text{Region Requested}) + .00159(\text{Tape EXCPS})$$

Using this algorithm for WCC priority 2, which costs 11¢ per CUU, estimates were made based on the following assumptions:

 - .. The average CPU time required per compilation is 10 seconds; per test run is 20 seconds; and per production run is 40 seconds
 - .. The average number of EXCPS per test run is 500; per production run is 100,000
 - .. There are no tape EXCPS.
- Data Storage - We estimated storage costs based on the WCC private mountable disk storage cost of \$50 per month rental and \$5 per mount of the disk.
- Communication Cost - Communication costs deal primarily with the amount of time necessary to enter data into the system and to receive information from the system via a remote terminal. Consequently, this cost is only associated with those alternatives that require an on-line environment. Remote terminal (on-line) communication costs were based on the low speed connect time cost of \$21 per hour.
- . Supplies/Other - Assumptions related to supplies and other items have been categorized as costs for document production and computer generated printouts.
- Document Production - Contractor document production costs were based on rates of \$6 per hour for secretarial personnel time and \$0.05 per page for reproduction costs. The actual pages of documentation and graphics were based on the requirements of each system alternative.

- Computer Generated Printouts - A standard cost of \$0.01 per page was used for printer paper cost. The actual number of pages printed was based on the requirements of each system alternative.

(2) Assumptions Regarding System Implementation Costs

Assumptions applied to implementation cost estimates are as follows:

- . Personnel Resources - Assumptions related to contractor personnel costs for the UIC system design and development are also applied to implementation with some additional assumptions:
 - EPA Personnel - In the description of EPA personnel for system design and development costs, we referred to the EPA project management function and pay rate. During the UIC system implementation phase, EPA personnel, in addition to the project management function, participate as trainees. Trainees are categorized as computer staff, clerical staff, or professional staff trainees. The following details the average rates for each staff type and are assumed to be opportunity cost estimates for EPA headquarters, or regional and state program personnel.
 - .. Computer staff members are assumed to cost \$12.38 per hour
 - .. Clerical staff members are assumed to cost \$6.36 per hour, or the equivalent of the GS 5/3 pay rate with fringes and overhead
 - .. Professional staff members are assumed to cost \$12.38 per hour.
- . Computer Resources - Assumptions related to computer resources for UIC system implementation are the same as for system design and development costs.
- . Supplies/Other - Assumptions related to supplies and other costs are the same as for system design and development costs.

(3) Assumptions Regarding System Operations Costs

System operating costs vary with the operational configuration within each system design alternative.

- . Computer Operations - Computer operation assumptions for system operations costs are the same as for UIC system design and development computer operation costs.

- . Manpower Operations - Assumptions relating to manpower operations are based on the operating requirements for each system alternative. The following lists the uniform assumptions made pertaining to system operations:
 - Data Entry - We assumed that data entry will be performed by a contractor with the coding rate equal to 3,000 characters per hour and a keypunch rate of 10,000 strokes per hour. Data entry personnel are assumed to cost \$6 per hour for coding and \$8 per hour for keypunching.
 - Computer Support Staff - We assumed that for each level of the UIC program implementation (i.e., EPA HQ, Regional or State level) varying amounts of ADP support staff will be required. These ADP staff personnel are assumed to cost \$12.38 per hour or the equivalent of a GS 11/5.
- . Supplies - Supply costs were estimated using the assumptions for UIC system design and development costs.
- . System Maintenance - The following details the assumptions which comprise system maintenance costs.
 - Computer Resources were estimated on the basis of one system maintenance action per month.
 - Management Costs were estimated to be 25% of the total computer support staff costs for each alternative.

2. COST STRATEGY

Because of the complexity of the decisions which face ODW in analyzing its alternatives for the Underground Injection Control Information System, we have presented the costing in two steps, oriented to the specific decisions. That is, we first make the decision as to what level of automation should be developed by EPA. This is presented in terms of the design and development of a system for EPA's own needs in administering State programs through the Regions. Whether the system is centralized or distributed does not significantly impact the alternative concepts analysis. Given the level of automation appropriate to EPA, we then proceed with the decision as to whether EPA should invest the additional funds in developing a distributed system to support the States who would prefer this approach.

In developing the cost to support the first decision, that is the appropriate level of automation, we have developed the following cost estimates for each alternative:

- . The costs for the design and development of the Underground Injection Information System from detailed design through systems test.

- . The cost to EPA Headquarters for the prototype implementation and operational maintenance of the system.
- . The additional implementation and operational costs for a typical small State administered by a Region (where small is defined as a State containing approximately 1,000 active UIC operations).
- . The additional implementation and operations cost for a large State supported by an EPA Region (where large is defined as approximately 35,000 UIC operations).

The first two of these costs is basically the fixed cost that would be incurred for the design and operation of a UIC Information System, where the latter two are incremental costs for the implementation and operation of each State within the Region. These costs are presented for both the base estimates and the full life cycle costs.

A cost analysis of alternative implementation approaches was then made for the recommended system concept. The implementation approaches are: centralized - provide access to the EPA software for States with primacy; distributed - implement the software on State facilities for States with primacy. Costs for the centralized concept were developed during the analysis of alternative system concepts. A comparative analysis of this approach to the distributed approach must be made. To accomplish this, we estimated each of the above cost components for the case in which EPA would design, develop, implement, and support the system on a distributed basis. This would require EPA to implement and support operation of both the centralized system and distributed State systems.

In the costing of the distributed systems, costs were included for the additional development costs for the portability of the distributed system, additional training for the State programs, and additional system maintenance cost in both EPA and the States. We decreased some cost items, such as the telecommunications costs, which would not be incurred by a State utilizing the distributed system.

In order to provide EPA with some basis for the magnitude of the cost impact of the centralized vs. distributed approach, while considering all of the various options the States would have in terms of primacy, we developed a series of three scenarios for the UIC program. These considered several different possibilities for the program in terms of the decisions of the designated States who accept primacy. These scenarios ranged from an assumption that many of the States would proceed with their own systems, to the potential that many of the States would participate with EPA in the UIC Information System.

3. COST MATRICES

To present the cost analysis of each system alternative, two Alternative System Cost Estimate matrices are utilized. These matrices, which are included as Exhibits IV-2 and IV-3 on the following pages, cross-tabulate the cost elements of the system life cycle. In the following paragraphs, the component parts of the matrices are described. However, presented first is a discussion of out-of-pocket expenses and opportunity costs.

The total of each system life cycle phase is categorized as either an out-of-pocket expense or an opportunity cost.

- . Out-of-Pocket Expenses - Out-of-pocket expenses represent those expenses which will be incurred through contractual services or through direct purchases. These expenses must be included in the budget and eventually necessitate the issuance of Treasury checks or, in the case of computer resources, an internal transfer of funds.
- . Opportunity Costs - Opportunity costs may not be additional dollar expenditures. Rather, in order to evaluate competing alternatives on an equal basis, these costs must be included as they represent a restriction of existing resources, in effect, lost opportunity. The opportunity costs in this analysis are those costs related to personnel. Measurable units, such as the number of hours required of professional staff, are expressed in dollars to permit a comparative evaluation. It is important to note that, although opportunity costs are not necessarily an additional dollar expenditure with a direct budget impact, they will become direct if there are no transferable resources available.

The other dimensions of the matrix are the strategies and cost components. The Systems Design and Development costs are one time expenditures which are EPA Headquarters specific. They are specific in the sense that all activity related to detailed design, programming, and testing, of the selected alternatives is entirely the responsibility of EPA Headquarters. These costs are collected in Exhibit IV-2.

Implementation costs and operating costs for EPA Headquarters and for each State using the system will be collected utilizing Exhibit IV-3. There are two points which must be addressed in the use of the Exhibit IV-3 cost matrix. Although implementation costs are traditionally assumed to be one-time in nature and would normally be presented along with system design and development costs, the implementation costs associated with each alternative are State specific and will vary depending upon the size of the implementing state, as is the case for operating costs.

The second point to be made with respect to Exhibit IV-3 is that it will be used three times for each alternative. Two Exhibit IV-3 matrices will present the implementation and operating costs for the

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE _____

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|-------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | | | | | | | | | | | |
| Program Specifications | | | | | | | | | | | |
| Program Development | | | | | | | | | | | |
| Documentation Preparation | | | | | | | | | | | |
| System Test | | | | | | | | | | | |
| Total Development Costs | | | | | | | | | | | |

ADMINISTRATIVE AGENCY / EPA HEADQUARTERS
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE _____

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|-------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | | | | | | | | | | | |
| | Total Implementation | | | | | | | | | | | |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | | | | | | | | | | | |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | | | | | | | | | | | |

administering agency (large and small), while the third Exhibit IV-3 matrix will be used to present the implementation and operating costs for EPA HQ. This distinction is made because some EPA implementation and operation costs are independent of number of States, and thus fixed in relation to number of States accepting the System.

As indicated in Exhibit IV-2, the cost elements of the design and development phase are:

- . Detailed system design
- . Program specifications
- . Program development
- . Documentation preparation
- . System test.

These are costs incurred to proceed from the feasibility study through system test, that is up to prototype operational testing.

The cost elements of the next phase, the implementation phase illustrated in Exhibit IV-3, are:

- . Data conversion
- . User Training
- . Prototype Operations.

The cost elements for system operation also are included in the Exhibit IV-3 cost matrix. These costs elements are:

- . Data entry and update
- . Processing and reporting
- . Management and analysis
- . System Maintenance.

These costs include all personnel expenditures directly attributable to the system processes required by the UIC system whether automated or manual. This cost matrix also provides operating costs for both an annual basis and for an assumed five years of system life. The life cycle cost represents the sum of implementation and five year operations costs. The cost analysis technique is illustrated in Exhibit IV-3A.

Cost estimates for an initial feasibility study of a system of this type are not sufficiently accurate to permit a valid estimate of

EXHIBIT IV-3A

| Case Number | Personal Resources | | | Educational Resources | | | | Ego | | |
|-------------|--------------------|---------------|-----------|-----------------------|---------------|-----------|-----------|---------------|-----------|--|
| | Available | Not Available | Not Known | Available | Not Available | Not Known | Available | Not Available | Not Known | |
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staff resources. Personnel costs were built up from manhour and volume estimates and are not a suggested means for estimating staffing requirements. The change in estimated personnel costs from alternative to alternative will give an indication of whether personnel resource requirements are expanding or diminishing. Once the general and detailed designs of the recommended alternative are complete, reliable staff estimates should be possible.

4. ALTERNATIVE WORKLOAD ASSUMPTIONS

Each of the UIC system alternatives proposed to ODW were subjected to an alternative cost analysis which is presented in Section 5 of this chapter. Supporting each analysis are the general workload assumptions used in analysis of each system alternative. These workload assumptions include:

- . File Sizes - For costing purposes, the following files and file sizes were used:
 - Permittee File -- 300 characters per record; 1,000 records for a small State; 35,000 records for a large State
 - Inventory File -- 80 characters per record; 10,000 records for a small State; 500,000 records for a large State
 - Violations and Compliance File -- 160 characters per record; number of records estimated between 10 and 200
 - Enforcement Action History File -- 80 characters per record; number of records estimated between 2 and 50.
- . Project Management Costs - Both EPA and contractor project management costs were calculated based on the number of calendar hours required to perform a task. For instance, if a task were estimated to require 400 personhours to complete and four persons were assumed to work on this task, the number of calendar hours required for task completion would be 100 hours (provided, of course, the longest sub-task required no more than 100 hours). Thus, assuming EPA project management consumes only 25% and the contractor project management consumes 10% of the total time expended per task, EPA project management in this case would equal 25% of the total calendar hours or 25 personhours and the contractor project management cost would be 10% of the total calendar hours or 10 personhours.
- . Data Entry Assumptions - The largest data entry expenditure for the UIC system occurs during the system implementation phase. Dependent upon the system design alternative, State manual files must be converted to automated and uniformly

formatted data files. This data conversion effort requires that each file record be coded onto a predetermined coding sheet prior to data keypunching. Implementation of the UIC system will, in all cases, include the conversion of the UIC operations inventory information, including injection wells, producing wells, and abandoned wells. The large/small volumes include the following inventory breakdown:

- Small - 10,000 wells; 1,000 injection wells; 1,200 abandoned wells; 7,800 producing wells
- Large - 500,000 wells; 35,000 injection wells; 300,000 abandoned wells; 165,000 producing wells.

We assume that violations, compliance and enforcement information will be incorporated as it is developed after the system becomes operational.

5. ALTERNATIVE COST ANALYSIS

Each of the alternative conceptual designs and implementation strategies discussed in Chapter III was subjected to a cost analysis. Supporting each analysis are specific assumptions for each alternative. Each alternative system cost has been estimated over the system design and development phase (detailed system design, program specifications, program development, system testing, and documentation preparation) and the implementation, operation and life cycle phase. Within each alternative, costs are broken down into resource costs (manpower, CPU time, supplies, etc.) for each phase. The design and development costs are presented as a separate cost unit. The implementation, operation and life cycle costs are presented in terms of large volume and small volume cost units for each alternative concept.

(1) UIC Alternative I Conceptual Design

In developing the manual system costs of Alternative I, we have made the assumption that the administering entity is a single agency. Discussed below are the other specific assumptions and cost analyses for the UIC Alternative I (Manual System)

- Specific Assumptions The following are the specific assumptions used to develop Alternative I costs:

- Required Files - The following are the required UIC system files, which will be created and maintained manually:
 - .. Permittee File
 - .. Inventory File

- .. Violations and Compliance File
- .. Enforcement Action File.
- Reports Generated - These reports will be prepared manually by the professional staff and the clerical staff of the administering entity.
 - .. Inventory Reports - Each administering entity will produce and update, periodically, inventory reports of underground injection wells and facilities.
 - .. Permit Status Reports - Each administering entity will produce and update reports of underground injection facility operations permit status.
 - .. Inspection Status Reports - Periodically, a report showing the status of the inspection program will be produced and maintained by this system.
- Data Entry and Update - The initial entry of manual inventory information will involve 10,000 records for a small Region and 500,000 for a large. In terms of data entry activity this means logging the record, screening it, and filing it. Additionally, it involves typing inventory lists for management
- Training - Under Alternative I, training will be provided for the professional and clerical staffs of the administering entity. The type and number of staff include the following:
 - .. Small Volume Administration
 - 2 Clerk/Typists
 - 2 Program/Analysts
 - 1 Program Supervisor
 - .. Large Volume Administration
 - 8 Clerk/Typists
 - 4 Program/Analysts
 - 1 Program Supervisor.

This staff configuration addresses only those types and numbers of staff which may be involved in one or more aspects of system maintenance; it is in no way an estimate of the staffing requirement.

The duration of the training session for the clerical and professional staff is assumed to be one week, regardless of the volume size. It is assumed that contractors will conduct training sessions.

- Processing and Reporting - Under Alternative I, processing and reporting will be done manually. Processing includes screening self-monitoring reports submitted by facility operators, identifying violations and follow-up. This will be done by the program analysts. Clerical support will include logging and filing the self-monitoring reports and typing various reports which are initially prepared by analysts. Volume figures for processing and reporting are:

.. 4,000 self-monitoring reports per year for small

.. 140,000 self-monitoring reports per year for large.

- Management Analysis - This consists of analyzing and reviewing system generated reports and other program documents. It is entirely a manual operation.

- . Alternative System Cost Estimates - Alternative I system costs are presented on Exhibit IV-4, IV-5a, IV-5b, and IV-5c. Exhibit IV-4 presents the system design and development costs for Alternative I. Similarly, Exhibits IV-5a through IV-5c present the implementation and recurring operational costs for Alternative I in terms of five-year life cycle costs. The first two exhibits, IV-5a and IV-5b, present the incremental costs for implementing and operating the system in a State. The last, IV-5c, presents the fixed EPA Headquarters costs required to implement and operate the system-independent of the number of such systems implemented. This is presumed minimal in this alternative because of the manual nature of the system.

(2) UIC Alternative II Conceptual Design

Discussed below are the specific assumptions and cost analyses for the UIC Alternative II (Basic Reporting System) conceptual design.

- . Specific Assumptions - The following are the specific assumptions used to develop Alternative costs.

- Number of Computer Programs - The following are the major categories and number of programs required by this alternative:

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE DESIGN ALTERNATIVE I - MANUAL SYSTEM

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|--------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | 22,500 | -- | 300 | 2,800 | -- | -- | -- | 1,000 | 23,500 | 3,100 | 26,600 |
| Program Specifications | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Program Development | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Documentation Preparation | 20,000 | -- | 300 | 2,100 | -- | -- | -- | 5,000 | 25,000 | 2,400 | 27,400 |
| System Test | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Development Costs | 42,500 | -- | 600 | 4,900 | -- | -- | -- | 6,000 | 48,500 | 5,500 | 54,000 |

ADMINISTRATIVE AGENCY COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE I - Manual - Small

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | 3,600 | | 500 | 1,700 | | | | 3,600 | 7,200 | 2,200 | 9,400 |
| | Prototype Operation | | | 11,400 | 9,600 | | | | 1,500 | 1,500 | 21,000 | 22,500 |
| | Total Implementation | 3,600 | | 11,900 | 11,300 | | | | 5,100 | 8,700 | 23,200 | 31,900 |
| First Year Operating | Data Entry & Update | | | 1,000 | 500 | | | | 100 | 100 | 1,500 | 1,600 |
| | Processing & Reporting | | | 8,300 | 5,100 | | | | 1,200 | 1,200 | 13,400 | 14,600 |
| | Management & Analysis | | | 4,100 | 14,700 | | | | 100 | 100 | 18,800 | 18,900 |
| | System Maintenance | | | 500 | 1,200 | | | | 100 | 100 | 1,700 | 1,800 |
| | Total First Year | | | 13,900 | 21,500 | | | | 1,500 | 1,500 | 35,400 | 36,900 |
| Life Cycle Operating | Data Entry & Update | | | 5,500 | 2,800 | | | | 600 | 600 | 8,300 | 8,900 |
| | Processing & Reporting | | | 45,900 | 28,200 | | | | 6,600 | 6,600 | 74,100 | 80,700 |
| | Management & Analysis | | | 22,700 | 81,200 | | | | 600 | 600 | 103,900 | 104,500 |
| | System Maintenance | | | 2,800 | 6,600 | | | | 600 | 600 | 9,400 | 10,000 |
| | Total Life Cycle | 3,600 | | 88,800 | 130,100 | | | | 13,500 | 17,100 | 218,900 | 236,000 |

ADMINISTRATIVE AGENCY
COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE I - LARGE/MANUAL

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | 3,600 | | 2,000 | 2,700 | | | | 3,900 | 7,500 | 4,700 | 12,200 |
| | Prototype Operation | | | 273,000 | 41,300 | | | | 7,500 | 7,500 | 314,300 | 321,800 |
| | Total Implementation | 3,600 | | 275,000 | 44,000 | | | | 11,400 | 15,000 | 319,000 | 334,000 |
| First Year Operating | Data Entry & Update | | | 76,000 | 1,100 | | | | 300 | 300 | 77,100 | 77,400 |
| | Processing & Reporting | | | 26,400 | 171,500 | | | | 4,500 | 4,500 | 197,900 | 202,400 |
| | Management & Analysis | | | 8,100 | 18,700 | | | | 300 | 300 | 26,800 | 27,100 |
| | System Maintenance | | | 2,500 | 1,200 | | | | 100 | 100 | 3,700 | 3,800 |
| | Total First Year | | | 113,000 | 192,500 | | | | 5,200 | 5,200 | 305,500 | 310,700 |
| Life Cycle Operating | Data Entry & Update | | | 419,900 | 6,100 | | | | 1,700 | 1,700 | 426,000 | 427,700 |
| | Processing & Reporting | | | 145,900 | 947,600 | | | | 24,900 | 24,900 | 1093.5 | 1118.4 |
| | Management & Analysis | | | 44,800 | 103,300 | | | | 1,700 | 1,700 | 148,100 | 149,800 |
| | System Maintenance | | | 13,800 | 6,600 | | | | 600 | 600 | 20,400 | 21,000 |
| | Total Life Cycle | 3,600 | | 899,400 | 1107.6 | | | | 40,300 | 43,900 | 2007.0 | 2050.9 |

EPA HEADQUARTERS
COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE I - EPA - FIXED COST

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|-------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | | | | | | | | | | | |
| | Total Implementation | | | | | | | | | | | |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 200 | 400 | | | | | 100 | 100 | 600 | 700 |
| | Total First Year | | 200 | 400 | | | | | 100 | 100 | 600 | 700 |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 1100 | 2200 | | | | | 600 | 600 | 3300 | 3900 |
| | Total Life Cycle | | 1100 | 2200 | | | | | 600 | 600 | 3300 | 3900 |

- .. 1 Edit/Update Module
- .. 1 Report Generator
- .. 1 Federal Data Extract Program
- Required Files - The following are the automated files required to be kept on disk(s) by Alternative II and associated configurations:
 - .. Permittee File
 - .. Inventory File
- Reports Generated - The following are the major Alternative II reports generated:
 - .. Various Error/Diagnostic Reports - one per edit/update program execution
 - .. Permit Status Reports - generated monthly for state level administrative agencies, and quarterly for EPA regional offices
 - .. Inventory Reports - generated annually for States, Regions and EPA Headquarters
 - .. UIC Annual Report - generated annually for EPA Headquarters, Congress, other agencies.
- Data Conversion - This consists of manual conversion of the operations inventory. For a small volume State, this entails 10,000 records while for a large volume state it entails 500,000 records. The activity consists of coding and keypunching the information. We have assumed this will be done by a vendor.
- Data Entry and Update - The following are the data entry volumes assumed for Alternative II:
 - .. Coding/Keypunching of Permittee Information - Dependent upon the entity size, this consists of those new operations and changes to existing operations which are posted to the files. We have assumed that this volume will be 700 records for small and 3,500 records for large. The incoming data will be coded and keypunched by a vendor.
- Training - It was assumed that two members of the contractor staff will conduct the training sessions at the administering entity. Three training sessions will be conducted, with one for the computer staff, another

for clerical staff and one for the UIC programmatic or professional staff. Also, it was assumed that EPA Headquarters will be responsible for out-of-pocket expenses.

- . Alternative System Cost Estimates - Alternative II system design and development cost and implementation, operation and life cycle costs are presented in Exhibits IV-6 IV-7a, IV-7b, and IV-7c.

(3) UIC Alternative III Conceptual Design

Discussed below are the specific assumptions and cost analyses for the UIC Alternative III (Tracking/Compliance System) conceptual design.

- . Specific Assumptions - The following are the specific assumptions used to develop costs for Alternative III:
 - Number of Computer Programs - The following are the major categories and number of programs required by this alternative:
 - .. 1 Edit-Update Module
 - .. 1 Compliance Monitoring
 - .. 2 Report Generators
 - .. 1 Federal Data Extract Program
 - Required Files - The following are the automated files required to be kept on disc(s) by Alternative III and associated configurations:
 - .. Permittee File
 - .. Inventory File
 - .. Violations and Compliance File
 - Reports Generated - All reports listed under Alternative II will be used by this alternative. In addition the following reports will be generated:
 - .. Inspection Schedules - generated annually and updated monthly to reflect changes which have occurred.
 - .. Inspection Reports - generated monthly for inspections scheduled for the coming month.

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE -----

DESIGN ALTERNATIVE II - BASIC REPORTING SYSTEM

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | 39,000 | --- | --- | 10,800 | --- | --- | --- | 14,400 | 53,400 | 10,800 | 64,200 |
| Program Specifications | 15,800 | --- | --- | 3,600 | --- | --- | --- | --- | 15,800 | 3,600 | 19,400 |
| Program Development | 21,800 | --- | --- | 6,000 | 7,600 | --- | --- | 200 | 29,600 | 6,000 | 35,600 |
| Documentation Preparation | 19,600 | --- | --- | 5,600 | --- | --- | --- | 2,400 | 22,000 | 5,600 | 27,600 |
| System Test | 19,600 | --- | --- | 5,600 | 12,400 | 200 | --- | 200 | 32,400 | 5,600 | 38,000 |
| Total Development Costs | 115,800 | --- | --- | 31,600 | 20,000 | 200 | --- | 17,200 | 153,200 | 31,600 | 184,800 |

ADMINISTRATIVE AGENCY

COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE II-Small

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 11,400 | 200 | 100 | 900 | 1,500 | 100 | 200 | 200 | 13,400 | 1,200 | 14,600 |
| | Training | 2,100 | 100 | 100 | 400 | | | | 500 | 2,600 | 600 | 3,200 |
| | Prototype Operation | 3,200 | 500 | 600 | 1,700 | 5,500 | 100 | 800 | 200 | 9,800 | 2,800 | 12,600 |
| | Total Implementation | 16,700 | 800 | 800 | 3,000 | 7,000 | 200 | 1,000 | 900 | 25,800 | 4,600 | 30,400 |
| First Year Operating | Data Entry & Update | 400 | 1,000 | 200 | 500 | 1,800 | 900 | 1,300 | 100 | 4,500 | 1,700 | 6,200 |
| | Processing & Reporting | | 2,500 | 2,300 | 12,200 | 7,600 | 800 | 1,600 | 100 | 10,100 | 17,000 | 27,100 |
| | Management & Analysis | | | 1,200 | 7,300 | | | | 100 | 100 | 8,500 | 8,600 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 400 | 3,500 | 3,700 | 20,000 | 9,400 | 1,700 | 2,900 | 300 | 14,700 | 27,200 | 41,900 |
| Life Cycle Operating | Data Entry & Update | 2,200 | 5,500 | 12,700 | 2,800 | 9,900 | 5,000 | 7,200 | 600 | 24,900 | 9,400 | 34,300 |
| | Processing & Reporting | | 13,800 | 6,700 | 67,400 | 42,000 | 4,400 | 8,800 | 600 | 55,800 | 93,900 | 149,700 |
| | Management & Analysis | | | | 40,300 | | | | 600 | 600 | 47,000 | 47,600 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 18,900 | 20,100 | 21,200 | 113,500 | 58,900 | 9,600 | 17,000 | 2,700 | 107,100 | 154,800 | 261,900 |

ADMINISTRATIVE AGENCY COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE II - Large

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------|--------------|------------------|--------------------|---------|---------------|-----------------|------------------------|-------------------|-----------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 423,000 | 1,000 | 5,500 | 900 | 2,600 | 300 | 400 | 4,500 | 430,800 | 7,400 | 438,200 |
| | Training | 2,100 | 100 | 200 | 600 | | | | 600 | 2,700 | 900 | 3,600 |
| | Prototype Operation | 3,200 | 500 | 900 | 2,700 | 9,700 | 200 | 800 | 500 | 14,400 | 4,100 | 18,500 |
| | Total Implementation | 428,300 | 1,600 | 6,600 | 4,200 | 12,300 | 500 | 1,200 | 5,600 | 447,900 | 12,400 | 460,300 |
| First Year Operating | Data Entry & Update | 2,100 | 1,000 | 74,200 | 700 | 4,900 | 1,500 | 1,300 | 200 | 10,000 | 75,900 | 85,900 |
| | Processing & Reporting | | 2,500 | 23,000 | 159,500 | 16,500 | 1,500 | 1,600 | 200 | 19,800 | 185,000 | 204,800 |
| | Management & Analysis | | | 1,600 | 9,800 | | | | 100 | 100 | 11,400 | 11,500 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 2,100 | 3,500 | 98,800 | 170,000 | 21,400 | 3,000 | 2,900 | 500 | 29,900 | 272,300 | 302,200 |
| Life Cycle Operating | Data Entry & Update | 11,600 | 5,500 | 410,000 | 3,900 | 27,100 | 8,300 | 7,200 | 1,100 | 55,300 | 419,400 | 474,700 |
| | Processing & Reporting | | 13,800 | 127,100 | 881,300 | 91,200 | 8,300 | 8,800 | 1,100 | 109,400 | 1,022,200 | 1,131,600 |
| | Management & Analysis | | | 8,800 | 54,200 | | | | 600 | 600 | 63,000 | 63,600 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 439,900 | 209,000 | 552,500 | 943,600 | 130,600 | 17,100 | 17,200 | 8,400 | 613,200 | 1,517,000 | 2,130,200 |

EPA HEADQUARTERS
COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE II - EPA - Fixed Cost

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | 3,200 | 500 | 600 | 1,700 | 5,500 | 100 | 800 | 200 | 9,800 | 2,800 | 12,600 |
| | Total Implementation | 3,200 | 500 | 600 | 1,700 | 5,500 | 100 | 800 | 200 | 9,800 | 2,800 | 12,600 |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 17,600 | | 4,400 | 16,400 | | 5,000 | | 21,400 | 22,000 | 43,400 |
| | Total First Year | | 17,600 | | 4,400 | 16,400 | | 5,000 | | 21,400 | 22,000 | 43,400 |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 97,300 | | 24,300 | 90,600 | | 27,600 | | 118,200 | 121,600 | 239,800 |
| | Total Life Cycle | 3,200 | 97,800 | 600 | 26,000 | 96,100 | 100 | 28,400 | 200 | 128,000 | 124,400 | 252,400 |

- .. Compliance History Reports - generated monthly or quarterly for states, and quarterly for EPA Headquarters and regions
- .. Violations Report - generated monthly for state program compliance and enforcement personnel.
- Data Entry Volumes - The following are the data entry volumes assumed for Alternative III:
 - .. Coding/Keypunching of Permittee Information - Same as Alternative II
 - .. Coding/Keypunching of Compliance Information - It was assumed that 700 records will be updated, deleted or added to automated files annually in a small volume entity, and 3,500 records in a large volume entity.
- Training - Same as Alternative II.
- . Alternative System Cost Estimates - Alternative III system development costs and implementation, operation and life cycle costs are presented in Exhibits IV-8, IV-9a, IV-9b, and IV-9c.

(4) UIC Alternative IV Conceptual Design

Discussed below are the specific assumptions and cost analyses for the UIC Alternative IV (Decision Support System) conceptual design.

- . Specific Assumptions - The following are the assumptions particular to the development of Alternative IV costing.
 - Number of Computer Programs - The following are the major categories and number of programs required:
 - .. 1 Edit/Update Module
 - .. 1 Compliance Module
 - .. 1 Enforcement Action Module
 - .. 1 Program Analysis Module
 - .. 2 Report Generators
 - .. 1 Federal Data Extract Program
 - Required Files - All files listed under Alternative III will be used by this alternative. In addition the following file will also be used:

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE _____

DESIGN ALTERNATIVE III - COMPLIANCE/TRACKING SYSTEM

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | 78,000 | --- | --- | 13,600 | --- | --- | --- | 14,400 | 92,400 | 13,600 | 106,000 |
| Program Specifications | 30,400 | --- | --- | 5,600 | --- | --- | --- | --- | 30,400 | 5,600 | 36,000 |
| Program Development | 43,600 | --- | --- | 9,600 | 10,000 | --- | --- | 200 | 53,800 | 9,600 | 63,400 |
| Documentation Preparation | 39,000 | --- | --- | 10,800 | --- | --- | --- | 2,800 | 41,800 | 10,800 | 52,600 |
| System Test | 39,000 | --- | --- | 8,800 | 16,800 | 200 | --- | 200 | 56,200 | 8,800 | 65,000 |
| Total Development Costs | 230,000 | --- | --- | 48,400 | 26,800 | 200 | --- | 17,600 | 274,600 | 48,400 | 323,000 |

ADMINISTRATIVE AGENCY
COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE III-Small

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 11,400 | 200 | 100 | 900 | 1,500 | 100 | 200 | 200 | 13,400 | 1,200 | 14,600 |
| | Training | 2,500 | 200 | 200 | 500 | | | | 700 | 3,200 | 900 | 4,100 |
| | Prototype Operation | 6,400 | 1,000 | 1,200 | 3,400 | 8,300 | 200 | 1,600 | 200 | 16,700 | 5,600 | 22,300 |
| | Total Implementation | 20,300 | 1,400 | 1,500 | 4,800 | 9,800 | 300 | 1,800 | 1,100 | 33,300 | 7,700 | 41,000 |
| First Year Operating | Data Entry & Update | 1,300 | 1,000 | 900 | 1,400 | 3,500 | 900 | 1,300 | 200 | 7,200 | 3,300 | 10,500 |
| | Processing & Reporting | | 3,800 | 1,800 | 7,200 | 12,800 | 1,200 | 2,400 | 200 | 16,600 | 12,800 | 29,400 |
| | Management & Analysis | | | 1,600 | 7,500 | | | | 200 | 200 | 9,100 | 9,300 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 1,300 | 4,800 | 4,300 | 16,100 | 16,300 | 2,100 | 3,700 | 600 | 24,000 | 25,200 | 49,200 |
| Life Cycle Operating | Data Entry & Update | 7,200 | 5,500 | 5,000 | 7,700 | 19,300 | 5,000 | 7,200 | 1,100 | 39,800 | 18,200 | 58,000 |
| | Processing & Reporting | | 21,000 | 9,900 | 39,800 | 70,700 | 6,600 | 13,300 | 1,100 | 91,700 | 70,700 | 162,400 |
| | Management & Analysis | | | 8,800 | 41,400 | | | | 1,100 | 1,100 | 50,200 | 51,300 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 27,500 | 27,900 | 25,200 | 93,700 | 99,800 | 11,900 | 22,300 | 4,400 | 165,900 | 146,800 | 312,700 |

ADMINISTRATIVE AGENCY COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE III - Large

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|-----------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 423,000 | 1,000 | 5,500 | 900 | 2,600 | 300 | 400 | 4,500 | 430,800 | 7,400 | 438,200 |
| | Training | 2,500 | 200 | 200 | 800 | | | | 800 | 3,300 | 1,200 | 4,500 |
| | Prototype Operation | 6,400 | 1,000 | 1,800 | 5,400 | 11,900 | 400 | 1,600 | 500 | 20,800 | 8,200 | 29,000 |
| | Total Implementation | 431,900 | 2,200 | 7,500 | 7,100 | 14,500 | 700 | 2,000 | 5,800 | 454,900 | 16,800 | 471,700 |
| First Year Operating | Data Entry & Update | 28,100 | 1,000 | 21,600 | 2,300 | 9,800 | 1,500 | 1,300 | 300 | 41,000 | 24,900 | 65,900 |
| | Processing & Reporting | | 3,800 | 16,500 | 62,800 | 24,800 | 2,300 | 2,400 | 300 | 29,800 | 83,100 | 112,900 |
| | Management & Analysis | | | 2,000 | 10,200 | | | | 200 | 200 | 12,200 | 12,400 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 28,100 | 4,800 | 40,100 | 75,300 | 34,600 | 3,800 | 3,700 | 800 | 71,000 | 120,200 | 191,200 |
| Life Cycle Operating | Data Entry & Update | 155,300 | 5,500 | 119,400 | 12,700 | 54,200 | 8,300 | 7,200 | 1,700 | 226,700 | 137,600 | 364,300 |
| | Processing & Reporting | | 21,000 | 91,200 | 347,000 | 137,000 | 12,700 | 13,300 | 1,700 | 164,700 | 459,200 | 623,900 |
| | Management & Analysis | | | 11,100 | 56,400 | | | | 1,100 | 1,100 | 67,500 | 68,600 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 587,200 | 28,700 | 229,700 | 423,200 | 191,200 | 21,700 | 22,500 | 10,300 | 847,400 | 681,100 | 1,528,500 |

EPA HEADQUARTERS COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE III - EPA - Fixed Cost

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | 6,400 | 1,000 | 1,200 | 3,400 | 8,300 | 200 | 1,600 | 200 | 16,700 | 5,600 | 22,300 |
| | Total Implementation | 6,400 | 1,000 | 1,200 | 3,400 | 8,300 | 200 | 1,600 | 200 | 16,700 | 5,600 | 22,300 |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 17,600 | | 4,400 | 24,600 | | 5,000 | | 29,600 | 22,000 | 51,600 |
| | Total First Year | | 17,600 | | 4,400 | 24,600 | | 5,000 | | 29,600 | 22,000 | 51,600 |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 97,300 | | 24,300 | 135,900 | | 27,600 | | 163,600 | 121,600 | 285,200 |
| | Total Life Cycle | 6,400 | 98,300 | 1,200 | 27,700 | 144,200 | 200 | 29,200 | | 180,300 | 127,200 | 307,500 |

- .. Enforcement Action File.
- Reports Generated - All reports listed under Alternative III will be used by this alternative. In addition the following reports will be generated:
 - .. Program Analyses Reports generated quarterly for State program administrations and regional staffs
 - .. Program Status Report generated quarterly for State program administrations and regional program monitors
 - .. Enforcement Action & Status Summary Reports generated monthly or quarterly for State enforcement staffs and regional program monitors.
- Data Entry and Update - The data entry volumes for this alternative increase marginally over that of Alternative III. The increase can be traced to the number of major enforcement actions. These are 2 for a small volume entity and 50 for a large volume entity, respectively.
- Training - Same as Alternative III, except that both professional training and ADP training sessions will be expanded.
- . Alternative IV System Cost Estimates - Alternative IV system design and development costs, and implementation, operations, and life cycle costs are presented in Exhibit IV-10, IV-11a, IV-11b, and IV-11c.

(5) UIC Alternative Cost Summary

Exhibits IV-12, IV-13, and IV-14 represent first-level analysis summaries of the detailed costs developed for each alternative. Exhibit IV-12, EPA Headquarters Life Cycle Cost Summary, aggregates costs from two exhibits from each alternative. The design and development row of this exhibit carries forward the total out-of-pocket and opportunity costs developed in each alternative's system design and development matrix. The implementation and operations rows of this exhibit carry forward the costs which were developed in the EPA Headquarters implementation and operations exhibits for each alternative. The life cycle row is therefore the sum of design and development, implementation, and operations.

Exhibit IV-13, Administering Agency Life Cycle Summary, aggregates costs from the detailed implementation and operations exhibit (administering agency) developed for both a large and a small administering agency. Out-of-pocket costs and opportunity

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE _____

DESIGN ALTERNATIVE IV - DECISION SUPPORT SYSTEM

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | 107,400 | --- | --- | 19,200 | --- | --- | --- | 14,400 | 121,800 | 19,200 | 141,000 |
| Program Specifications | 41,400 | --- | --- | 8,400 | --- | --- | --- | --- | 41,400 | 8,400 | 49,800 |
| Program Development | 60,200 | --- | --- | 14,400 | 17,600 | --- | --- | 200 | 78,000 | 14,400 | 92,400 |
| Documentation Preparation | 53,800 | --- | --- | 17,200 | --- | --- | --- | 4,000 | 57,800 | 17,200 | 75,000 |
| System Test | 53,800 | --- | --- | 14,000 | 29,400 | 400 | --- | 200 | 83,800 | 14,000 | 97,800 |
| Total Development Costs | 316,600 | --- | --- | 73,200 | 47,000 | 400 | --- | 18,800 | 382,800 | 73,200 | 456,000 |

ADMINISTRATIVE AGENCY ; COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE IV-Small

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 11,400 | 200 | 100 | 900 | 1,500 | 100 | 200 | 200 | 13,400 | 1,200 | 14,600 |
| | Training | 4,200 | 200 | 300 | 800 | | | | 1,000 | 5,200 | 1,300 | 6,500 |
| | Prototype Operation | 6,400 | 1,000 | 1,200 | 3,400 | 9,300 | 200 | 1,600 | 200 | 17,700 | 5,600 | 23,300 |
| | Total Implementation | 22,000 | 1,400 | 1,600 | 5,100 | 10,800 | 300 | 1,800 | 1,400 | 36,300 | 8,100 | 44,400 |
| First Year Operating | Data Entry & Update | 1,300 | 1,000 | 900 | 1,400 | 3,500 | 900 | 1,300 | 200 | 7,200 | 3,300 | 10,500 |
| | Processing & Reporting | | 4,700 | 1,600 | 7,400 | 14,200 | 1,500 | 3,000 | 200 | 18,900 | 13,700 | 32,600 |
| | Management & Analysis | | | 2,000 | 8,000 | | | | 200 | 200 | 10,000 | 10,200 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 1,300 | 5,700 | 4,500 | 16,800 | 17,700 | 2,400 | 4,300 | 600 | 26,300 | 27,000 | 53,300 |
| Life Cycle Operating | Data Entry & Update | 7,200 | 5,500 | 5,000 | 7,700 | 19,300 | 5,000 | 7,200 | 1,100 | 39,800 | 18,200 | 58,000 |
| | Processing & Reporting | | 26,000 | 8,800 | 40,900 | 78,500 | 8,300 | 16,600 | 1,100 | 104,500 | 75,700 | 180,200 |
| | Management & Analysis | | | 11,100 | 44,200 | | | | 1,100 | 1,100 | 55,300 | 56,400 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 29,200 | 32,900 | 26,500 | 97,900 | 108,600 | 13,600 | 25,600 | 4,700 | 181,700 | 157,300 | 339,000 |

COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE IV - Large

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|-----------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 423,000 | 1,000 | 5,500 | 900 | 2,600 | 300 | 400 | 4,500 | 430,800 | 7,400 | 438,200 |
| | Training | 4,200 | 200 | 400 | 1,200 | | | | 1,200 | 5,400 | 1,800 | 7,200 |
| | Prototype Operation | 6,400 | 1,000 | 1,800 | 5,400 | 12,900 | 400 | 1,600 | 500 | 21,800 | 8,200 | 30,000 |
| | Total Implementation | 433,600 | 2,200 | 7,700 | 7,500 | 15,500 | 700 | 2,000 | 6,200 | 458,000 | 17,400 | 475,400 |
| First Year Operating | Data Entry & Update | 28,300 | 1,000 | 22,000 | 2,300 | 9,800 | 1,500 | 1,300 | 300 | 41,200 | 25,300 | 66,500 |
| | Processing & Reporting | | 4,600 | 17,300 | 60,200 | 35,600 | 2,800 | 3,000 | 400 | 41,800 | 82,100 | 123,900 |
| | Management & Analysis | | | 2,500 | 10,500 | | | | 200 | 200 | 13,000 | 13,200 |
| | System Maintenance | | | | | | | | | | | |
| | Total First Year | 28,300 | 5,600 | 41,800 | 73,000 | 45,400 | 4,300 | 4,300 | 900 | 83,200 | 120,400 | 203,600 |
| Life Cycle Operating | Data Entry & Update | 156,400 | 5,500 | 121,600 | 12,700 | 54,200 | 8,300 | 7,200 | 1,700 | 227,800 | 139,800 | 367,500 |
| | Processing & Reporting | | 25,400 | 95,600 | 332,600 | 196,700 | 15,500 | 16,600 | 2,200 | 231,000 | 453,600 | 684,600 |
| | Management & Analysis | | | 13,800 | 58,000 | | | | 1,100 | 1,100 | 71,800 | 72,900 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 590,000 | 33,100 | 238,700 | 410,800 | 266,400 | 24,500 | 25,800 | 11,200 | 917,900 | 682,600 | 1,600,500 |

EPA HEADQUARTERS
COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE IV - EPA - FIXED COST

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------|--------------|------------------|--------------------|---------|---------------|-----------------|------------------------|-------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | 6,400 | 1,200 | 1,200 | 3,900 | 9,300 | 200 | 1,600 | 200 | 17,700 | 6,300 | 24,000 |
| | Total Implementation | 6,400 | 1,200 | 1,200 | 3,900 | 9,300 | 200 | 1,600 | 200 | 17,700 | 6,300 | 24,000 |
| | | | | | | | | | | | | |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 20,200 | | 5,100 | 30,300 | | 5,000 | | 35,300 | 25,300 | 60,600 |
| | Total First Year | | 20,200 | | 5,100 | 30,300 | | 5,000 | | 35,300 | 25,300 | 60,600 |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 111,600 | | 28,200 | 167,400 | | 27,600 | | 195,000 | 139,800 | 334,800 |
| | Total Life Cycle | 6,400 | 112,800 | 1,200 | 32,100 | 176,700 | 200 | 29,200 | 200 | 212,700 | 146,100 | 358,800 |

EPA HEADQUARTERS LIFE CYCLE COST SUMMARY
EPA HQ LIFE CYCLE COST SUMMARY

(DOLLARS IN THOUSANDS)

| | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|---------------------------------|---------------|--------------|-------|---------------|--------------|-------|---------------|--------------|-------|---------------|--------------|-------|
| | Out of Pocket | Oppor-tunity | Total | Out of Pocket | Oppor-tunity | Total | Out of Pocket | Oppor-tunity | Total | Out of Pocket | Oppor-tunity | Total |
| Design & Development | 48.5 | 5.5 | 54.0 | 153.2 | 31.6 | 184.8 | 274.6 | 48.4 | 323.0 | 382.8 | 73.2 | 456.0 |
| Implementation | - | - | - | 9.8 | 2.8 | 12.6 | 16.7 | 5.6 | 22.3 | 17.7 | 6.3 | 24.0 |
| Operation | .6 | 3.3 | 3.9 | 118.2 | 121.6 | 239.8 | 163.6 | 121.6 | 285.2 | 195.0 | 139.8 | 334.8 |
| Life Cycle | 49.1 | 8.8 | 57.9 | 281.2 | 156.0 | 437.2 | 454.9 | 175.6 | 630.5 | 595.5 | 219.3 | 814.8 |

**ADMINISTRATIVE AGENCY
LIFE CYCLE IMPLEMENTATION & OPERATIONS
COST SUMMARY**

(DOLLARS IN THOUSANDS)

| | | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|--------------------------------|----------------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|
| | | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total | Out of Pocket | Oppor- tunity | Total |
| SMALL ADMINISTRATIVE AGENCY | Implementation | 8.7 | 23.2 | 31.9 | 25.8 | 4.6 | 30.4 | 33.3 | 7.7 | 41.0 | 36.3 | 8.1 | 44.4 |
| | Operation | 8.4 | 195.7 | 204.1 | 81.3 | 150.2 | 231.5 | 132.6 | 139.1 | 271.7 | 145.4 | 149.2 | 294.6 |
| | Life Cycle | 17.1 | 218.9 | 236.0 | 107.1 | 154.8 | 261.9 | 165.9 | 146.8 | 321.7 | 181.7 | 157.3 | 339.0 |
| LARGE ADMINISTRATIVE AGENCY | Implementation | 15.0 | 319.0 | 334.0 | 447.9 | 12.4 | 460.3 | 454.9 | 16.8 | 471.7 | 458.0 | 17.4 | 475.4 |
| | Operation | 28.9 | 1688.0 | 1716.9 | 165.3 | 1504.6 | 1669.9 | 392.5 | 664.3 | 1056.8 | 459.9 | 665.2 | 1125.1 |
| | Life Cycle | 43.9 | 2007.0 | 2050.9 | 613.2 | 1517.0 | 2130.2 | 847.4 | 681.1 | 1528.5 | 917.9 | 682.6 | 1600.5 |

costs for each are carried forward to the appropriate cells in the implementation and operation rows for each alternative. The life cycle represents the sum of implementation and operations costs.

Exhibit IV-14 represents aggregate life cycle costs which will be incurred for a large administering agency if it incurred all system associated costs. Out-of-pocket and opportunity costs for the system design and development row are brought forward from the system design and development exhibit of each alternative. With respect to the EPA Headquarters implementation and operation row, the total out-of-pocket and opportunity costs are brought forward from each alternative exhibit. The same procedures will also apply for the administering agency implementation and operations row. This basically presents the costs to EPA if only one State were implemented. The lowest cost is for the manual approach, which indicates that development of an independent UIC Information System would not be justified for an individual State. However, implementation of Alternative III by EPA can almost be cost justified for one large State implementation. Assuming more than one such State will utilize the system, the cost savings are potentially significant.

The following paragraphs provide an analysis of these summaries.

- . System Design and Development Costs - System design and development costs are highest in Alternative IV. This is due to the maximum automated capability and the level of complexity built into the system. These characteristics are reflected in the significant increase in development time incurred by both contractor and EPA personnel. Additionally, computer processing costs are greatly increased in testing Alternative IV. The lowest design and development costs are shown in Alternative I, the manual system. This cost reflects the development and documentation of a series of manual procedures for an EPA Region which is administering the program. It consists of EPA personnel resources, both professional and clerical, expended in the procedures development process. The increasing automated capabilities of Alternatives II and III are indicated by the increased cost of development. The most significant increment among the automated alternatives occurs between II and III. This is due to a significant increase in automated system capability, going from a file maintenance, report generator capability to that same capability with the addition of a compliance oriented automated process which develops and tracks schedules and screens monitoring reports. Although development costs increase from alternative to alternative, the automated capability of each additional concept is significantly increased as well.

**LIFE CYCLE COST PROJECTIONS
(DOLLARS IN THOUSANDS)
LARGE STATE**

| Cost Components | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | ALTERNATIVE 3 | | | ALTERNATIVE 4 | | |
|---|------------------------|-------------------|---------------|------------------------|-------------------|---------------|------------------------|-------------------|---------------|------------------------|-------------------|---------------|
| | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total | Out-of-Pocket Expenses | Opportunity Costs | Total |
| System Design & Development | 48.5 | 5.5 | 54.0 | 153.2 | 31.6 | 184.8 | 274.6 | 48.4 | 323.0 | 382.8 | 73.2 | 456.0 |
| EPA Headquarters Implementation and Operations | .6 | 3.3 | 3.9 | 128.0 | 124.4 | 252.4 | 180.3 | 127.2 | 307.5 | 212.7 | 146.1 | 358.8 |
| Administration Agency Implementation and Operations | 43.9 | 2007.0 | 2050.9 | 613.2 | 1517.0 | 2130.2 | 847.4 | 681.1 | 1528.5 | 917.9 | 682.6 | 1600.5 |
| LIFE CYCLE | 93.0 | 2015.8 | 2108.8 | 894.4 | 1673.0 | 2567.4 | 1302.3 | 856.7 | 2159.0 | 1513.4 | 901.9 | 2415.3 |

- . System Implementation Cost - Two sets of implementation costs were developed for each alternative system concept. Costs were developed for a large volume administering agency and a small volume administering agency. This approach was chosen due to the mix of designated States in terms of the number of wells in each State's inventory. Life cycle costs assume a 5-year system life cycle. The costs for implementing the automated alternatives in both the large and small volume environments increase incrementally from Alternative II through Alternative IV. This same pattern is followed in the transition from the manual system (Alternative I) to the basic automated system (Alternative II) in a large volume environment. This pattern is not the case in the small volume environment, although the relative difference for implementation between Alternative I and II is negligible. What is of interest between Alternatives I and II is the significant increase in opportunity costs. Out-of-pocket costs increased because of the data conversion process which will be performed by a vendor. Additionally, there is a dramatic decrease in the opportunity costs between Alternatives I and II. This is attributed to the significant manual effort required in prototype operations to initiate the inventory files, set up the filing controls, and additional manual effort which utilizes a considerable amount of time. When the files are automated in Alternative II, this manual cost is reduced to a minimum. Costs between Alternatives II, III and IV do not vary significantly for a small volume, although the automation capability increases significantly between II and III. The capability/cost increase ratio shows some significant cost increments in a large volume environment, specifically between II and III.

With respect to EPA Headquarters implementation costs, these are only incurred in the automated alternatives. In the manual systems alternative, we have made the assumption that implementation costs will be included in the States and fixed costs would be minimal. On the other hand, EPA Headquarters will incur implementation costs in the automated alternatives due to the support which will be provided to the States in the form of a prototype operation. Increases in implementation costs in the transition from Alternative II to Alternative IV are attributable to the fact that the increasing level of automation inherent in the transition will accrue increased incremental costs. This pattern applies as well to the components of the implementation totals -- out-of-pocket cost and opportunity costs.

- . System Operating Costs - Operating costs exhibit two general patterns which are a function of the volume environment. In the small volume environment, operating costs increase from alternative to alternative, while in the large volume

environment, these costs decrease (with the exception of Alternative IV where there is a small increase). A further analysis into the components of operating costs is a key factor in the explanation of these patterns. Out-of-pocket costs for both the large and small environment show increases as the level of automation increases. With increasing levels of automation, machine costs are the determining factors. On the other hand, opportunity costs for both the large and small volume environment decrease as the levels of automation increase (with the exception of Alternative IV). Further analysis of opportunity costs reveals a significantly larger percentage decrease in the transition from Alternative II to Alternative III for the large volume environment as opposed to the small volume environment. The decrease in itself for both environments can be explained by the fact that screening of the monitoring reports becomes automated in Alternative III. The percentage decrease is explained by volume (4000 reports in the small environment; 140,000 reports in the large environment). As a final point in this analysis, the absolute magnitude of opportunity cost decreases far outweigh the dollar increases in out-of-pocket costs in the large environment, thus resulting in decreasing total operating costs. In the small environment, this is not the case. The small magnitude of decrease in opportunity costs does not counterbalance or exceed the magnitude increase in out-of-pocket expenses. As a result, total operating costs rise with increasing levels of automation in the small environment.

With respect to EPA Headquarters operating cost, we can see that these costs increase as the level of automation increases. This is entirely a function of systems maintenance. In the manual alternative, system maintenance will be no more than periodic documentation and procedures revisions performed centrally at EPA Headquarters. In the automated alternative, operating costs rise more significantly due to the scope and complexity of the systems maintenance to be performed.

6. EFFECTIVENESS ANALYSIS OF ALTERNATIVES

In the analysis described in Chapter III, each alternative system concept was evaluated against the evaluation criteria defined in Chapter II. The pattern which emerged was one of increasing capability in each alternative, a decreasing requirement for labor intensive functions, and increasing system complexity requiring potentially some modification to typical skill mixes. This effectiveness evaluation can be translated into impacts on the administration, monitoring, and program management functions. The incremental impact of each of the alternative system concepts is illustrated in Exhibit IV-15. In the following paragraphs, the effectiveness of the alternatives is briefly discussed, with regard to each of the three participating groups,

UIC SYSTEM ALTERNATIVE IMPACT ANALYSIS

| | ALTERNATIVE 1 | ALTERNATIVE 2 | ALTERNATIVE 3 | ALTERNATIVE 4 |
|---|---|--|---|---|
| EPA Headquarters | <ul style="list-style-type: none"> ● Hard Copy Annual Reports ● Limited Response To Information Requests | <ul style="list-style-type: none"> ● Improved Response To Information Requests | <ul style="list-style-type: none"> ● Substantial Part of Annual Reports Received in Machine Readable Form ● Effective Response to Information Requests | |
| EPA Region Program Monitor | <ul style="list-style-type: none"> ● Hard Copy Summary Reports Received ● Limited Response To Information Requests ● Inventory Maintained from Hard Copy | <ul style="list-style-type: none"> ● Effective Response To Information Requests-Inventory, Permits ● Limited Response To Requests for Enforcement Information ● Inventory Maintained from Machine Readable Reports | <ul style="list-style-type: none"> ● Effective Response To Information Requests ● Machine Readable Reports Received ● Inventory Maintained from Machine Readable Reports | <ul style="list-style-type: none"> ● Facilitated Program Review |
| Region or State Level Program Administration | <ul style="list-style-type: none"> ● Standardized Procedures for Handling UIC Data ● Heavy Manpower Resource Requirement to Manually Record Data ● Labor Intensive Reporting | <ul style="list-style-type: none"> ● Effective Permit Tracking ● Effective Response to Requests Regarding Inventory Data ● Labor Intensive Self-Monitoring Report Record Keeping ● Compliance Monitoring Limited To Available Manpower Resources ● Labor Intensive Compliance Reporting | <ul style="list-style-type: none"> ● Effective Operations Tracking & Monitoring ● Effective Response to Information Requests ● Optimum Resource Allocation | <ul style="list-style-type: none"> ● Extend Enforcement Tracking Support ● Facilitated Program Effectiveness Analysis |

Region/State Administrators, Regional Monitor, and EPA Headquarters Program Managers. In addition, an analysis of alternative system implementation approaches is provided.

(1) Regional/State Administrators

This group of participants is comprised of States which have accepted primacy and Regions which are administering the program for non-primacy States. The functions of this group encompass the day-to-day operations for permit issuance, permit and compliance tracking, self-monitoring reports processing, and enforcement scheduling and tracking.

- . Alternative I is a totally manual system comprised of logging and control procedures, report development, and operations management. Implementation of the system would establish common procedures which would facilitate communication with the monitoring function, and assure that all required data are maintained. However, record keeping and reporting are labor intensive operations under this alternative. For environments which generate data of any great volume the system will require a large labor force and will suffer the inaccuracies which typically result from manual data handling. The system may be effective if a State which manages the UIC program via multiple agencies has a sufficiently small UIC activity that work distributed among the agencies can be handled manually.
- . Alternative II provides for automated permit tracking and an automated operations inventory. This alternative effectively reduces workload by automating permit application processing. Effective response to information requests regarding either the inventory or permit status is provided via the automated system. However, a major manual workload in the form of self-monitoring reports received periodically still remains. As a result, the compliance monitoring function is significantly limited. Preparation of summary reports is facilitated by the automated inventory and permit files, but data on compliance activities must still be compiled manually.
- . Alternative III provides for automation of all the permit, inventory, and compliance operations. The manual workload is significantly decreased as a result of automated processing of permit applications and self-monitoring reports. Effective response to information requests can be provided, since all data is accessible by computer. A somewhat different skill mix may be required if the State or Region does not already employ systems staff. However, this alternative should result in the elimination of major manual operations which can be effectively accomplished via automation.

- . Alternative IV provides the same automated capability as Alternative III, but includes the additional automated functions of enforcement tracking and program effectiveness analysis. The enforcement tracking function provides an advanced capability to assist in determining required enforcement actions, and to track the actions from initiation to closeout. The program effectiveness capability analyzes program performance in terms of previously determined objectives. Both of these capabilities are advanced program management and require some sophistication on the part of the user. The capability could contribute to program effectiveness but does represent a possible new staffing requirement.

(2) EPA Regional Monitors

The EPA Regional monitoring function is directed at ensuring the effectiveness of the programs conducted by delegated States. This function consists of receipt and review of quarterly reports submitted by the delegated States, periodic on-site review of State operations, and response to requests for information regarding the UIC program.

- . Alternative I, as a manual system, will result in hard copy periodic reports submitted to the Region. The Region will have to enter the inventory data from hard copy. The manual system will have the effect of limiting the response to information requests asked of the Region and forwarded to the administering State. Confidence in detailed data will be low due to anticipated error rates in manual data handling.
- . Alternative II, which automates permit tracking and inventory maintenance for the administration function, provides some advantages to the monitoring Region as well. The inventory can be updated from machine readable media. The response to requests for information concerning permit status will be improved. However, periodic reports submitted to EPA regarding State activities will be hard copy. Also, manual access to compliance activity records by the administering State/Region will limit responsiveness to compliance information requests.
- . Alternative III, which includes automated compliance tracking and self-monitoring reports processing, will provide advantages to the monitoring Region. As in Alternative II, inventory maintenance will be facilitated via machine readable input. Response to information requests will be facilitated due to mostly automated records. In addition, annual reports to the monitoring Region can be provided in mostly machine readable format to facilitate entry into the Federal Reporting System.

- Alternative IV encompasses all capabilities of Alternative II with the addition of automated enforcement tracking support, and facilitated program effectiveness analysis. These analytical capabilities should facilitate program review conducted periodically at the administering State or Region.

(3) EPA Headquarters Program Management

The program management function is concerned with assuring the effectiveness of the nationwide UIC program. In addition, EPA Headquarters is the focal point of information requests from the Congress and the public. To support this function, a Federal Reporting System will be developed to contain an inventory of all operations and summaries of UIC activities. The source for this data will be the annual and quarterly reports submitted by the States or administering Regions.

The system concept employed by the administering States or Regions affects the Program Management function in two ways:

- By the ease with which data is reported, because it affects timeliness and accuracy
- By the assistance it provides to the State/Region, because effective support can improve program administration.

In this sense, each of the alternatives provides some advantage to the Headquarters function. This advantage is essentially parallel to the advantages provided to the Administering State or Region.

- Alternative I, as a manual capability, provides the minimal advantage of standardizing record keeping and reporting.
- Alternatives II and III provide partial automated support to daily operations. As such, they represent effective tools for program administration and information reporting.
- Alternative IV provides the same daily operations support as Alternative III with the addition of advanced analytical capabilities. These analytical functions provide a useful tool for management analysis which, if utilized by the administering State or Region, helps to assure EPA Headquarters of effective program management at the program administration level.

7. UIC SYSTEM CONCEPT RECOMMENDATION

An analysis of the costs and benefits of the alternatives leads to the recommendation for Alternative III. This recommendation represents the maximum automated capability which can be achieved

through a straightforward system which does not require advanced technical skills to operate.

Based upon the cost estimates, we believe that, if EPA is to administer at least one large State, the additional cost for implementation, design, and development of Alternative III over Alternative I is justified in terms of life cycle cost. This primarily reflects the substantial decrease in operating cost due to the automated screening and maintenance of self-monitoring reports in Alternative III. Alternative IV provides the same capability but is always more costly than Alternative III. Alternative IV also provides management analysis and support capability; however, this added complexity does not appear justified in the near term.

On the assumption that more than one large State, or Region with a large State, will utilize the UIC Information System, we recommended implementation of Alternative III. This is based upon:

- . Alternative III offers the lowest implementation and operation cost to an Administrative Agency for all but the smallest agencies
- . Implementation in only one large Administrative Agency almost cost justifies EPA's fixed costs
- . Alternative III minimizes the manual reporting burden on the Administrative Agency
- . The added complexity of Alternative IV does not meet the evaluation criteria for minimizing required levels of technical support
- . Alternative III provides significantly more management reporting and analysis capability than Alternative II, as well as a cost advantage.

In summary, Alternative III offers significant advantages to EPA both in terms of cost and effectiveness.

8. ALTERNATIVE SYSTEM IMPLEMENTATION APPROACHES

The decision with regard to centralization or distribution is the question whether EPA will develop a system and implement it in individual states (distribution) or whether the Agency will develop a system for use by the Regions which the States may access if they so desire (centralization). There are considerable costs involved in this decision, but there are other considerations as well. The impacts of the alternatives on both EPA Headquarters and the State are illustrated in Exhibit IV-16. These impacts are discussed in the paragraphs below, and are then followed by a cost analysis.

**UIC INFORMATION SYSTEM
IMPLEMENTATION ALTERNATIVES IMPACT ANALYSIS**

| | CENTRAL | DISTRIBUTED |
|-----------------------------|---|---|
| EPA Headquarters | <ul style="list-style-type: none"> ● Facilitates Change and Enhancement as Program Evolves ● Easier System Maintenance ● Encourages Common System Use ● Heavier Processing Workload | <ul style="list-style-type: none"> ● Major Coordination Requirement ● Requires Development of Transportable Software-Technologically Demanding ● May Encourage Primacy ● May Encourage Standard Systems |
| State | <ul style="list-style-type: none"> ● Limited to Standard Processing Cycles ● System Maintenance is More Timely ● Not Necessary to Acquire an Automated Capability ● State Particular Enhancements Limited | <ul style="list-style-type: none"> ● Processing Cycles at State Discretion ● State Responsible for Own System Maintenance and Operation ● Automated Capability Required |

(1) Centralized Implementation Alternative

The centralized implementation alternative is simply a matter of extending the configuration developed for the Regions to include States who wish to use the EPA UIC information systems. In this case the software and data bases are maintained at a central EPA facility. Access to appropriate data bases by the regions and States is via terminals and remote printers. The security of an individual State's data can be maintained via limitation of access to only that State. The system will access the Federal Reporting System directly.

The impact of the alternative on EPA Headquarters is in terms of facilitating system management and encouraging the use of a common system. Maintenance functions will be performed on one set of software. Similarly, system modifications will also be performed, after agreement by all users, on one set of software. As a consequence, system changes can be accomplished more efficiently. The Headquarters facility will experience a heavier processing workload. However, the centralized implementation may encourage use of a single system and thereby simplify EPA monitoring functions.

The impact on the State is one of limitation and efficiency; for example, processing cycles and system modification may be established on the basis of a consensus of users rather than on the prerogative of one State. Similarly, State particular enhancements are limited to those which can be effected without disturbing the configuration of the basic system. However, centralized system maintenance will be performed on a timely basis. In addition, since processing is provided by EPA, the State does not need to acquire an automated capability of its own to process UIC data.

(2) Distributed Implementation Alternative

The distributed implementation alternative includes the implementation of the UIC Information System at a State facility. This option does not eliminate the central option, but adds another dimension. In the distributed mode using the decentralized option, copies of the software would interface remotely with the Federal Reporting System.

The impact on the EPA Headquarters of the distributed approach results in a major coordination activity for system maintenance and modification. In addition, system development is more complex in that the system must be transportable and therefore as machine independent as possible. However, making the system available to the States on their own facilities may encourage operation of standard systems which simplifies the EPA monitoring function.

The impact on the States is primarily one of greater use of State resources. The State is responsible for operation of the system and for implementing the changes disseminated by EPA. However, processing cycles are purely at State discretion and limited local enhancement is feasible so long as it does not disrupt the integrity of supplied software. Any enhancement, however, could seriously jeopardize the standardized aspects of the system and may require significant additional maintenance costs.

It may be observed that although there are impacts of each alternative on EPA and the States, they are not conclusive. Costs will play a large part in the decision. A cost analysis is provided in the next section.

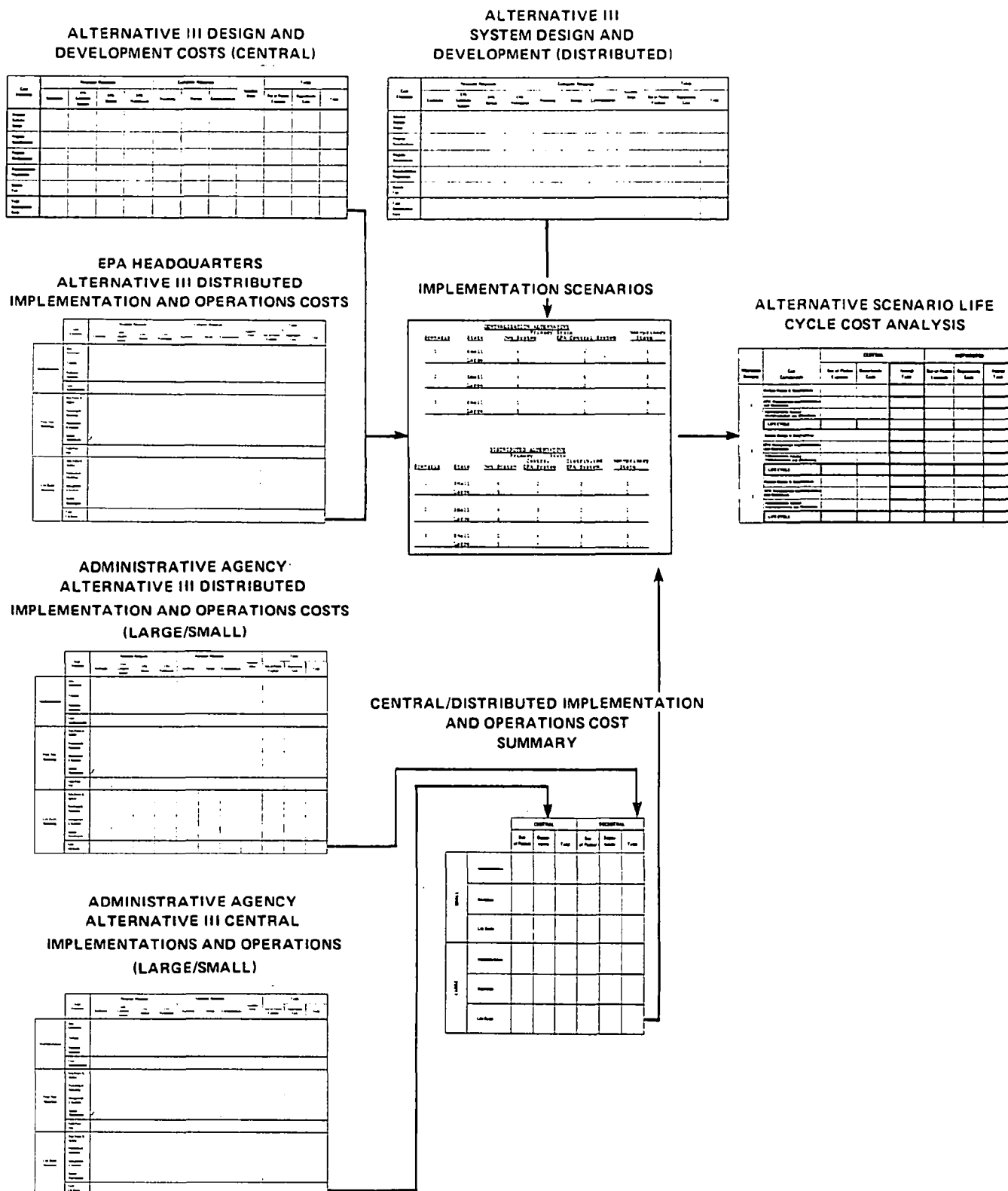
(3) Cost Analysis of Alternative Implementation Strategies

A cost analysis of the alternative implementation strategies was conducted. The cost analysis technique is illustrated in Exhibit IV-16A. Costs from the centralized and distributed approaches were developed first on the basis of costs associated with a State which would operate the system in a centralized mode and a State which uses the distributed mode. An additional dimension was added by developing costs for both a small volume State and a large volume State (Exhibits IV-17 and IV-18). The changes from the centralized mode reflect additional training and operating costs at the administrative agency resulting from the system's residence at the State facility.

In addition, the fixed costs for design and development were modified for the distributed alternative (Exhibit IV-19), as well as implementation and operation at EPA Headquarters (Exhibit IV-20). The modifications to the design and development costs represent the additional effort to develop a system which is as machine independent as possible to permit implementation on a variety of State computers. Changes to the implementation and operation costs at EPA Headquarters reflect increased maintenance costs because of additional packaging of system changes, and coordination and dissemination to States in which the system is implemented. Exhibit IV-21 is a summary chart illustrating the implementation, operation, and life cycle costs for a State under the distributed alternative. The chart shows significantly increased costs resulting from the processing and maintenance being done by the individual State rather than centrally.

Three scenarios were then selected which represented various combinations of State roles. The three scenarios are presented in Exhibit IV-22. They represent a range of possible actions by the States in response to the UIC Program and EPA's initiative in system development.

ALTERNATIVE IMPLEMENTATION STRATEGIES COST ANALYSIS



ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE III - DISTRIBUTED SMALL

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 11,400 | 1,000 | 2,400 | 1,000 | 2,300 | | | 200 | 13,900 | 4,400 | 18,300 |
| | Training | 3,700 | 500 | 900 | 1,200 | | | | 700 | 4,400 | 2,600 | 7,000 |
| | Prototype Operation | 10,200 | 5,000 | 14,400 | 3,800 | 12,500 | | | 200 | 22,900 | 23,200 | 46,100 |
| | Total Implementation | 25,600 | 6,500 | 17,700 | 6,000 | 14,800 | | | 1,100 | 41,200 | 30,200 | 71,400 |
| First Year Operating | Data Entry & Update | 1,300 | 1,000 | 900 | 2,300 | 5,300 | | | 200 | 6,800 | 4,200 | 11,000 |
| | Processing & Reporting | | 3,800 | 4,300 | 7,200 | 19,200 | | | 200 | 19,400 | 15,300 | 34,700 |
| | Management & Analysis | | | 1,600 | 7,500 | | | | 200 | 200 | 9,100 | 9,300 |
| | System Maintenance | | 16,700 | | 4,200 | 11,700 | | | | 11,700 | 20,900 | 32,600 |
| | Total First Year | 1,300 | 21,500 | 6,800 | 21,200 | 36,200 | | | 600 | 38,100 | 49,500 | 87,600 |
| Life Cycle Operating | Data Entry & Update | 7,200 | 5,500 | 5,000 | 12,700 | 29,300 | | | 1,100 | 37,600 | 23,200 | 60,800 |
| | Processing & Reporting | | 21,000 | 23,800 | 39,800 | 106,100 | | | 1,100 | 107,200 | 108,300 | 215,500 |
| | Management & Analysis | | | 8,800 | 41,400 | | | | 1,100 | 1,100 | 50,300 | 51,400 |
| | System Maintenance | | | | | | | | | | | |
| | Total Life Cycle | 32,500 | 125,300 | 37,600 | 123,100 | 214,800 | | | 4,400 | 251,700 | 273,500 | 484,000 |

**ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE III DISTRIBUTED LARGE**

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | 423000 | 6800 | 11600 | 1700 | 3900 | - | - | 4500 | 431400 | 20100 | 451500 |
| | Training | 3700 | 1000 | 3500 | 1500 | - | - | - | 800 | 4500 | 6000 | 10500 |
| | Prototype Operation | 10200 | 2500 | 4500 | 13500 | 17900 | - | - | 500 | 28600 | 20500 | 49100 |
| | Total Implementation | 436900 | 10300 | 19600 | 16700 | 21800 | - | - | 5800 | 464500 | 46600 | 511100 |
| First Year Operating | Data Entry & Update | 28100 | 1000 | 22000 | 2300 | 14700 | - | - | 300 | 43100 | 25300 | 68400 |
| | Processing & Reporting | - | 3800 | 16800 | 63000 | 37200 | - | - | 300 | 37500 | 83600 | 121100 |
| | Management & Analysis | - | - | 2000 | 10200 | - | - | - | 200 | 200 | 12200 | 12400 |
| | System Maintenance | - | 16700 | - | 4200 | 23000 | - | - | - | 23000 | 20900 | 43900 |
| | Total First Year | 28100 | 21500 | 40800 | 79700 | 74900 | - | - | 800 | 103800 | 142000 | 245800 |
| Life Cycle Operating | Data Entry & Update | 155300 | 5500 | 121600 | 12700 | 81200 | - | - | 1700 | 238200 | 139800 | 378000 |
| | Processing & Reporting | - | 21000 | 92800 | 348100 | 205600 | - | - | 1700 | 207300 | 463000 | 670300 |
| | Management & Analysis | - | - | 11100 | 56400 | - | - | - | 1100 | 1100 | 67400 | 68500 |
| | System Maintenance | - | 92300 | - | 23200 | 127100 | - | - | - | 127100 | 115500 | 242600 |
| | Total Life Cycle | 592200 | 129100 | 245000 | 457100 | 435700 | - | - | 10300 | 1038200 | 832300 | 1870500 |

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM DESIGN AND DEVELOPMENT
ALTERNATIVE III DISTRIBUTED-----

| Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|-------------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Detailed Systems Design | 93,600 | | | 16,300 | | | | 14,400 | 108,000 | 16,300 | 124,300 |
| Program Specifications | 36,500 | | | 6,700 | | | | | 36,500 | 6,700 | 43,200 |
| Program Development | 52,300 | | | 11,500 | 12,000 | | | 200 | 64,500 | 11,500 | 76,000 |
| Documentation Preparation | 46,800 | | | 13,000 | | | | 3,400 | 50,200 | 13,000 | 63,200 |
| System Test | 46,800 | | | 10,600 | 20,200 | 200 | | 200 | 67,400 | 10,600 | 78,000 |
| Total Development Costs | 276,000 | | | 58,100 | 32,200 | 200 | | 18,200 | 326,600 | 58,100 | 384,700 |

ALTERNATIVE SYSTEM CONCEPTS COST ESTIMATES
SYSTEM IMPLEMENTATION AND OPERATIONS
ALTERNATIVE _ _ _ III - DISTRIBUTED EPA - FIXED COST

| | Cost Elements | Personnel Resources | | | | Computer Resources | | | Supplies/ Other | Totals | | |
|----------------------|------------------------|---------------------|----------------------------|-----------------|---------------------|--------------------|---------|---------------|--------------------|---------------------------|----------------------|---------|
| | | Contractor | EPA Computer Support | EPA Clerical | EPA Professional | Processing | Storage | Communication | | Out of Pocket Expenses | Opportunity Costs | Total |
| Implementation | Data Conversion | | | | | | | | | | | |
| | Training | | | | | | | | | | | |
| | Prototype Operation | 6,400 | 1,000 | 1,200 | 3,400 | 8,300 | 200 | 1,600 | 200 | 16,700 | 5,600 | 22,300 |
| | Total Implementation | 6,400 | 1,000 | 1,200 | 3,400 | 8,300 | 200 | 1,600 | 200 | 16,700 | 5,600 | 22,300 |
| First Year Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 21,100 | | 5,300 | 29,500 | | 6,000 | | 35,500 | 26,400 | 61,900 |
| | Total First Year | | 21,100 | | 5,300 | 29,500 | | 6,000 | | 35,500 | 26,400 | 61,900 |
| Life Cycle Operating | Data Entry & Update | | | | | | | | | | | |
| | Processing & Reporting | | | | | | | | | | | |
| | Management & Analysis | | | | | | | | | | | |
| | System Maintenance | | 116,600 | | 29,300 | 163,000 | | 33,200 | | 196,200 | 145,900 | 342,100 |
| | Total Life Cycle | 6,400 | 117,600 | 1,200 | 32,700 | 171,300 | 200 | 34,800 | 200 | 212,900 | 151,500 | 364,400 |

LIFE CYCLE IMPLEMENTATION & OPERATIONS
COST SUMMARY

| | | CENTRAL AL | | | DISTRIBUTED | | |
|-------|----------------|---------------|--------------|--------|---------------|--------------|--------|
| | | Out of Pocket | Oppor-tunity | Total | Out of Pocket | Oppor-tunity | Total |
| SMALL | Implementation | 33.3 | 7.7 | 41.0 | 41.2 | 30.2 | 71.4 |
| | Operation | 132.6 | 139.1 | 271.7 | 210.5 | 273.5 | 484.0 |
| | Life Cycle | 165.9 | 146.8 | 312.7 | 251.7 | 303.7 | 555.4 |
| LARGE | Implementation | 454.9 | 16.8 | 471.7 | 464.5 | 46.6 | 511.1 |
| | Operation | 392.5 | 664.3 | 1056.8 | 573.6 | 784.6 | 1358.2 |
| | Life Cycle | 847.4 | 681.1 | 1528.5 | 1038.1 | 831.2 | 1869.3 |

**SCENARIOS FOR CENTRAL VS DISTRIBUTED
ALTERNATIVE IMPLEMENTATIONS**

| <u>CENTRALIZATION ALTERNATIVE</u> | | | | |
|-----------------------------------|--------------|-------------------|---|------------------------------------|
| <u>Scenario</u> | <u>State</u> | <u>Own System</u> | <u>Primacy State</u> <u>EPA Central System</u> | <u>Non-Primacy</u> <u>State</u> |
| 1 | Small | 6 | 4 | 1 |
| | Large | 5 | 1 | 2 |
| 2 | Small | 4 | 5 | 2 |
| | Large | 4 | 2 | 1 |
| 3 | Small | 1 | 7 | 3 |
| | Large | 5 | 1 | 1 |

| <u>DISTRIBUTED ALTERNATIVE</u> | | | | |
|--------------------------------|--------------|-------------------|---|------------------------------------|
| <u>Scenario</u> | <u>State</u> | <u>Own System</u> | <u>Primacy State</u> <u>Central EPA System</u> | <u>Non-Primacy</u> <u>State</u> |
| 1 | Small | 6 | 2 | 1 |
| | Large | 5 | — | 1 |
| 2 | Small | 4 | 3 | 1 |
| | Large | 4 | 1 | 1 |
| 3 | Small | 1 | 4 | 3 |
| | Large | 5 | — | 1 |

Utilizing these assumptions we have developed the full costs for the alternative implementation strategies under the scenarios. These costs are presented in Exhibit IV-23. The additional cost burden of the distributed approach is clear in this summary. The costs are due to the additional system maintenance and operational costs attributable to the distributed alternative.

The impact on EPA, as shown by the scenarios, increases significantly as the States decide to accept the system at their own facilities. This cost must be balanced against the potential advantages of the distributed alternative, as opposed to advantages of the centralized alternatives, to EPA and the States.

As a result, this is a policy decision which goes beyond the domain of this study. However, we have assumed that ODW would proceed with the centralized approach for this system. The reasons for this assumption are:

- . The cost impacts on EPA for a distributed approach would be significant
- . We believe the negative aspects of State use of a centralized system could be alleviated through proper system design and confidentiality procedures.

The details of the recommendations are presented in the next chapter.

**ALTERNATIVE SCENARIOS LIFE CYCLE COST PROJECTIONS
(DOLLARS IN THOUSANDS)**

| Alternative Scenario | Cost Components | CENTRAL | | | DISTRIBUTED | | |
|----------------------|--|------------------------|-------------------|--------------|------------------------|-------------------|--------------|
| | | Out-of-Pocket Expenses | Opportunity Costs | Annual Total | Out-of-Pocket Expenses | Opportunity Costs | Annual Total |
| 1 | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementation and Operations | 2524.3 | 2096.2 | 4620.5 | 2886.6 | 2560.1 | 5446.7 |
| | LIFE CYCLE | 2979.2 | 2271.8 | 5251.0 | 3426.1 | 2769.4 | 6195.5 |
| 2 | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementation and Operations | 3,703.5 | 3,070.9 | 6,774.4 | 4,065.8 | 3,534.8 | 7,600.6 |
| | LIFE CYCLE | 4,158.4 | 3,246.5 | 7,404.9 | 4605.3 | 3744.1 | 8349.4 |
| 3 | System Design & Development | 274.6 | 48.4 | 323.0 | 326.6 | 58.1 | 384.7 |
| | EPA Headquarters Implementation and Operations | 180.3 | 127.2 | 307.5 | 212.9 | 151.2 | 364.1 |
| | Administrative Agency Implementations and Operations | 3353.8 | 2830.2 | 6184.0 | 3801.9 | 3451.0 | 7252.9 |
| | LIFE CYCLE | 3808.7 | 3005.8 | 6814.5 | 4341.4 | 3660.3 | 8001.7 |

V. RECOMMENDATIONS

V. RECOMMENDATIONS

The system concept recommended, Alternative III, consists of both manual and automated support activities to the UIC program at the administering level. Automated support is provided to those program functions which are characterized by high volume of data, necessity for timely response, and effective use of available resources. The manual support activity is provided to those functions which are characterized by low volume of data, and fewer requirements for expeditious action.

We have also recommended a centralized approach for implementation of the UIC Information System. Another consideration in implementation, not discussed above, is the phasing of implementation. The UIC Information System, when implemented, will support the initial set of designated States, the majority of which are oil and gas producers. Since the major underground injection activity relates to the production of oil and gas, it is imperative that the system have the capability, as a minimum, to service the oil and gas related activity. Although there is underground injection activity not related to oil and gas within many designated States, when compared against the oil and gas related wells this volume is relatively insignificant. We recommend that the system be brought up in a phased approach both in terms of function and data maintained. We recommend at the outset of system operation only data relating to oil and gas related activities be maintained on the automated files. We anticipate that after the system has been operational for some time, and a level of confidence has been developed, the additional injection activity data can be included.

This chapter describes the recommended system automated activities and manual activities and a phased implementation plan for the recommended system.

1. RECOMMENDED UIC SYSTEM ACTIVITIES

The UIC management information system is designed to support program administrator activities, whether they are performed by a State or an EPA Region. At the same time, the system is flexible enough to support the monitoring activity of EPA by providing a base of summary level information. The system is comprised of several major activities which must be performed within the UIC system in order to achieve previously defined objectives. The automated activities include:

- . Track permit applications and maintain permits
- . Maintain UIC operations inventory

- . Develop and track inspection schedule
- . Screen and maintain self-monitoring reports and violations history
- . Respond to inquiries.

In addition, there are manual activities which handle low volume data and are analytical in nature. These are:

- . Screen and maintain inspection findings
- . Initiate and track enforcement actions
- . Analyze program effectiveness

Exhibit V-1 shows the automated and manual activities, inputs, outputs, and internally maintained information provided by the recommended UIC management information system.

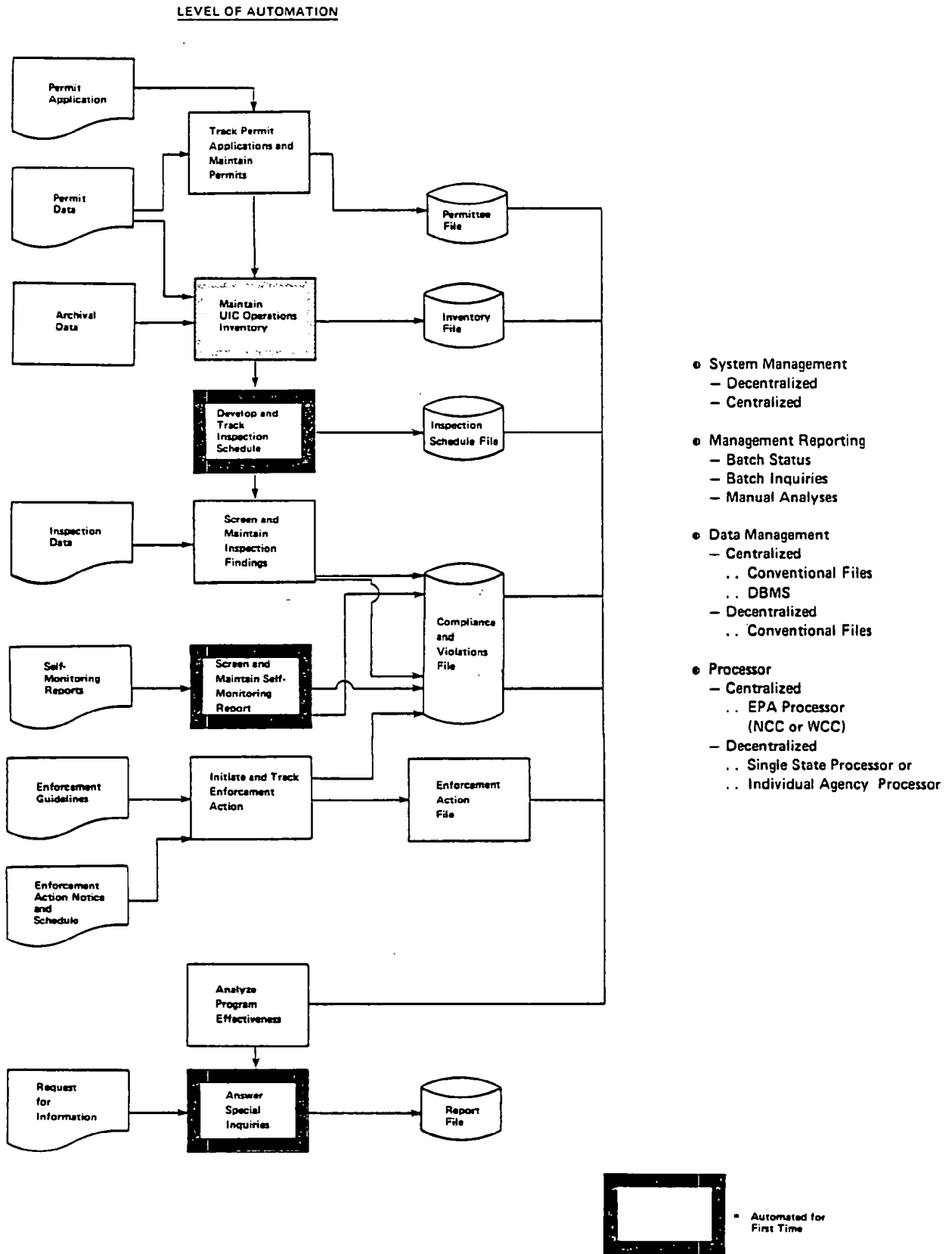
Each activity is also composed of certain subactivities, inputs, outputs and internally maintained information requirements. These are described in the paragraphs which follow. Reports produced by the automated system are listed in Exhibit V-2.

(1) Activity 1: Track Permit Applications and Maintain Permits

Exhibit V-3 shows the inputs, outputs, and subactivities which will be performed in this activity. Activity 1 identifies facilities that have been sent permit applications, and tracks the status of the applications. When an application is reviewed and approved, the information on the approved permit is maintained. Activity 1 consists of the following subactivities:

- . Initiate Permit Applicant File - When an application is sent to a prospective permittee, the basic applicant and application information will be entered into the UIC information systems by the program permit staff.
- . Screen Incoming Applications - As an application is submitted, it is screened for completeness by the permit staff who then enter an application received status into the Permit Applicant record.
- . Identify Delinquent Applications - Periodically, the Permit Applicant File will be scanned and those applicants who have not submitted applications by the application due date will be reported. The permit staff will notify the applicants that their applications are overdue.

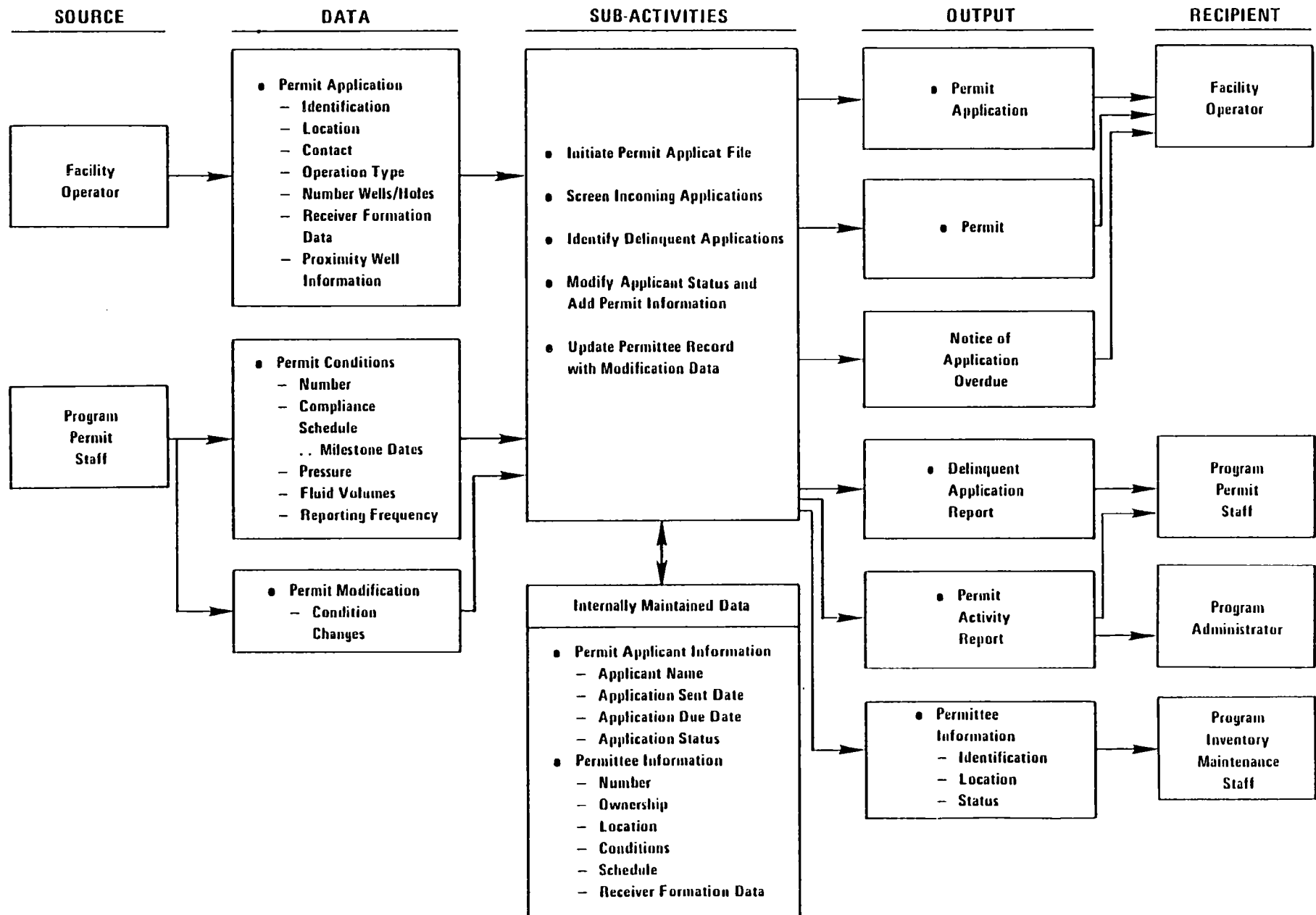
UIC INFORMATION SYSTEM
DESIGN ALTERNATIVE 3



UIC INFORMATION SYSTEM REPORTS

| ACTIVITY AND REPORTS | USE | FREQUENCY |
|--|--|-----------|
| <u>Permit Application Tracking and Maintenance</u> | | |
| ● Delinquent Applications Report | Exception Report Indicates Overdue Application Submittals Triggers Notification to Operator of Overdue Status | Monthly |
| ● Permit Activity Report | Management Report Provides Data on Number of Permits Issued, Types, Recipients, and Conditions | Quarterly |
| <u>Maintain UIC Operations Inventory</u> | | |
| ● Inventory Maintenance Report | Error Detection Tool for System Managers. Lists Additions, Deletions, and Status Changes | Quarterly |
| ● Inventory Status Report | Provides Inventory Update Information with Summary and Control Totals for Use by the Program Administrator | Quarterly |
| <u>Develop and Track Inspection Schedule</u> | | |
| ● Inspection Schedule | List of Scheduled Inspections which Identifies the Operation to be Inspected and the Date | Monthly |
| ● Scheduled Inspection Assessment Report | Management Report which Inspection Schedules, Completions and Delays | Quarterly |
| <u>Screen and Maintain Self-Monitoring Reports</u> | | |
| ● Notice of Violation | Exception Report Indicating a Violation was Found. Triggers a Notice to the Operator | Quarterly |
| ● Violations List | List of Violations Detected, for Review and Follow-up by Enforcement Staff. | Quarterly |
| ● Compliance Report | Management Report of Compliance Activity Indicating Number and Types of Violations, Compliance and Inspection Actions | Quarterly |
| <u>Answer Special Inquiries</u> | | |
| ● Ad Hoc Reports | Response to Special Requests for Information Such as: Status of Permits, Enforcement Actions; Total Activities; Individual Operator Status | Monthly |

TRACK PERMIT APPLICATIONS AND MAINTAIN PERMIT



- . Modify Applicant Status and Add Permit Information - When a permit application is approved and a permit issued, the permit staff will acknowledge this by updating the Permit Applicant record to Permittee status. The UIC system will enter all pertinent permit information onto the records.
- . Update Permittee Record with Modification Information - When a facility operator requests and is granted a modification to his permit, the modified information will be entered onto the Permittee record through the UIC system.

The input required to support these subactivities includes:

- . Permit Application - Provides the ownership/operator identification information, the operation location and classification, and the operation technical information. This information is supplied by the facility operator.
- . Permit Conditions - Provides the conditions set forth in the permit such as allowable pressures and volumes, construction compliance schedule for a new facility, and required self-monitoring reporting frequency. This information is supplied by the program permit staff.
- . Permit Modifications - Provides the revised permit information when a permit modification is granted. This information is supplied by the program permit staff.

The internally maintained information for this activity will include:

- . Permit Application Information - The permit application will identify the applicant by name, location, and classification of operation. Additionally, such information as the date the application was sent, the date the application is due, and the current status of the application will be maintained. This information will support the application tracking activity.
- . Permittee Information - The permit information will identify the specific conditions imposed upon the facility operator. These include the allowable pressure he must comply with in his injection operation, and the allowable volume of fluid that can be injected. In the case of construction permit for a new facility or a facility modification, the information will identify the construction compliance schedule which the facility operator will follow.

The major output of this activity includes:

- . Permit Application - This application form is sent to the facility operator for completion and submittal to the program permit staff.

- . Permit - Upon approval of the permit application, the Permit is issued to the facility operator. With the Permit, the facility can now legally operate.
- . Delinquent Application Report - This report identifies those applicants whose application submittals are overdue. It is sent to the program permit staff who follow up by notifying the applicant that the application is overdue.
- . Permit Activity Report - This report provides information for the Program Administrator to assess the effectiveness of the permit process. It provides data on the number of applications outstanding, the number of permits issued, the type of permits issued, the permit recipients, and the conditions imposed upon them.

(2) Activity 2: Maintain UIC Operations Inventory

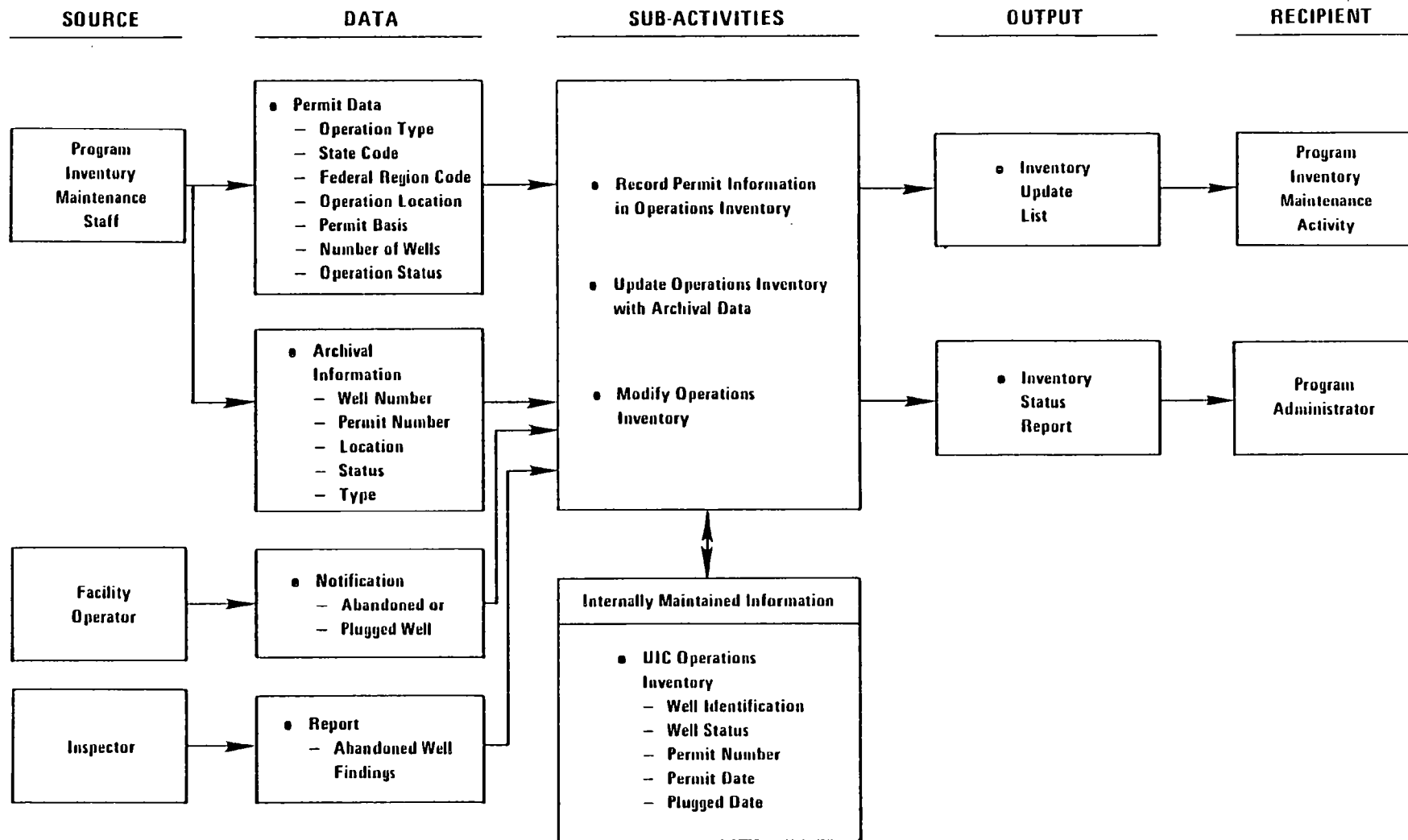
Exhibit V-4 shows the inputs, outputs, and subactivities required to initiate and maintain the UIC operations inventory. Activity 2 initiates and maintains, through periodic updates, an inventory of all underground injection operations, both active and inactive for which there is available data. This activity will be performed by the programs inventory maintenance staff. Major subactivities include:

- . Record Permit Information Operations Inventory - Selects that information from the Permit which is relevant to the operations inventory, and records this data on an inventory record. This ensures that all new underground injection operations are entered onto the operations inventory.
- . Update Operations Inventory with Archival Data - The operations inventory will consist of both active and inactive underground injection operations. The data for entering and maintaining the inactive operations will come from archival records. An operations inventory record will be created and maintained for those operations that have archive records.
- . Modify Operations Inventory - Periodically, there is a need to modify existing inventory records. The modification is usually due to a change in status of the underground injection operation. Status changes include plugging, abandonment, or an operational status change. Additionally, change in ownership or contact will initiate an inventory modification.

The input required by this activity includes the following:

- . Permit Data - This is the information on the permit that is necessary to initiate an inventory record. The data provides

MAINTAIN UIC OPERATIONS INVENTORY



operation identification, location, permit basis, number of wells affected, and operational status information. This information is supplied by the program inventory maintenance staff.

- . Archival Information - Provides data relating to inactive and active wells which have been in existence for a number of years. The information may include well number, permit number, location, classification, and status. The information will be supplied by the program inventory maintenance staff.
- . Plugged or Abandoned Well Notification - Provides information indicating a change in status of an operating well. This information is supplied by the facility operator and can be in the form of a notice or a plugged well permit application.
- . Inspection Report - Provides information concerning operation abandonments and pluggings which have not previously come to the attention of the inventory maintenance staff. This information is supplied by the inspector.

The required internally maintained information for this activity includes:

- . UIC Operations Inventory - The UIC Operations Inventory is the repository of all information pertaining to active and inactive underground injection operations. The inventory identifies the operation ownership, location, contact point, classification, status, permit number, and pertinent dates.

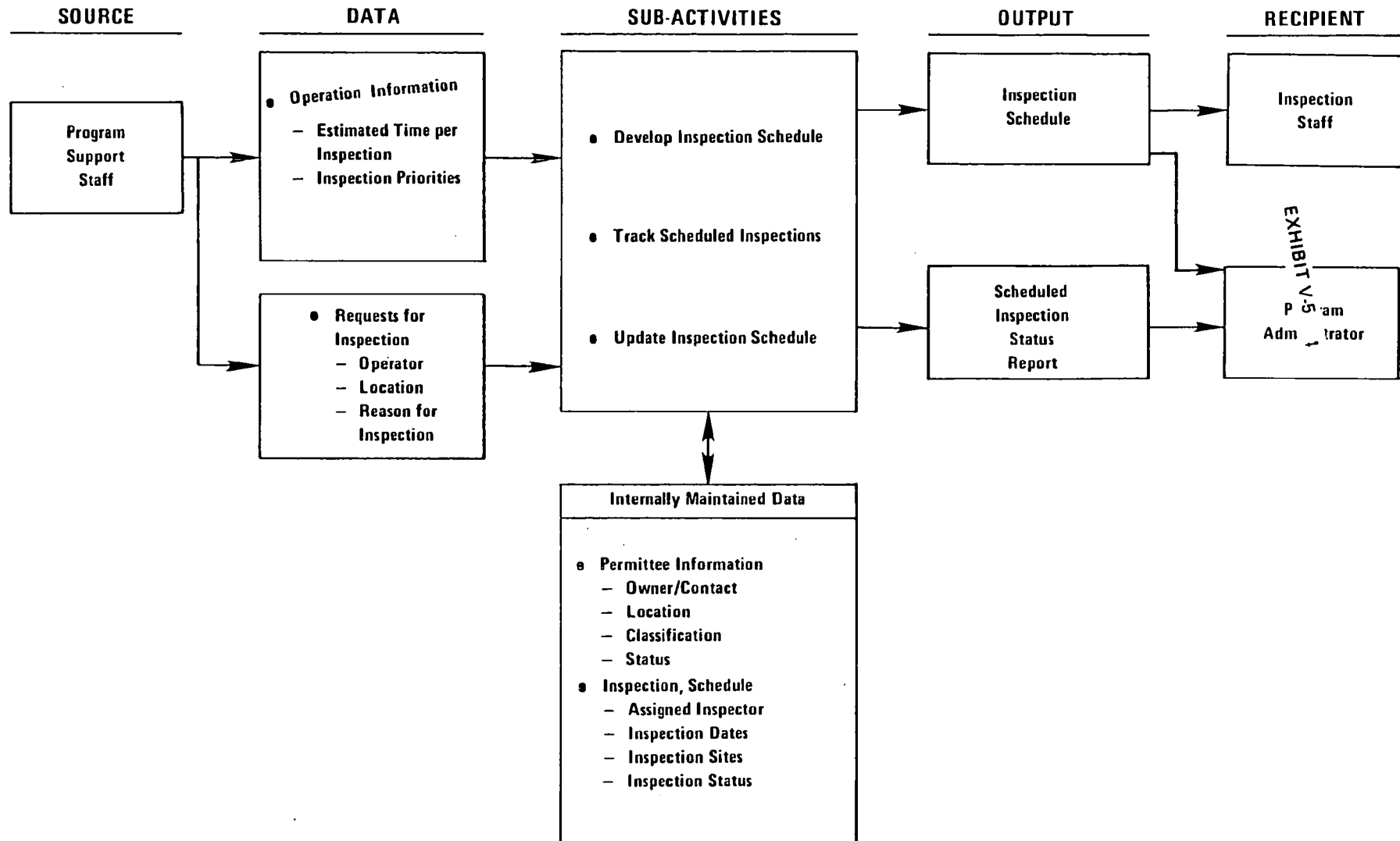
The output of this activity will include:

- . List of Inventory Updates - Each time the inventory is updated the UIC system will provide the inventory maintenance activity with a listing which shows the additions, deletions, and status changes which caused the update to occur.
- . Inventory Status Report - A report providing the inventory update information summary and control totals depicting the current inventory will be produced for the program administrator.

(3) Activity 3: Develop and Track Inspection Schedule

Exhibit V-5 shows the inputs, outputs, and subactivities required to develop and track inspections. Activity 3 develops a schedule of inspections based upon number of operations, and estimated time for inspection. Once the schedule is developed,

DEVELOP AND TRACK INSPECTION SCHEDULE



the system will track the schedule to ensure that scheduled inspections are being performed. This would be an optional capability utilized at management's discretion. Major subactivities include:

- . Develop Inspection Schedule - Based upon average time between inspections, and the governing inspection priorities, the UIC system will produce an annual schedule of facility site inspections.
- . Track Schedule Inspections - Periodically after the scheduled inspection date, the system will check whether the inspection findings have been filed, and update the inspection status accordingly.
- . Update Inspection Schedule - From time to time the program inspection staff will receive requests to conduct unscheduled inspections. In this case, the UIC system will, upon receiving inspection request information, add the inspection to the schedule.

The input required by this activity includes:

- . Operation Information - The inspection schedule will be based on the average time between inspections required, and the inspection priorities which have been specified. This information will be supplied by the program support staff.
- . Request for Inspection - At times, it will be necessary to conduct inspections which have not been scheduled. These inspections are usually requested by members of the program support staff. The request for inspection information includes identification of the operator to be inspected, and the facility location.

The internally maintained information will include:

- . Permittee Information - The identifying information that will be included on the exception report is provided by the permittee file. This includes the owner name, operation location, operation classification and status.
- . Inspection Schedule - Provides the means with which to track inspections by scanning the inspection status. The inspection schedule identifies the date of inspection, and the site of inspection.

The output generated by this activity includes:

- . Inspection Schedule - This is the list of inspections scheduled to be conducted during the upcoming year. It identifies the site, and the date of inspection.

- . Scheduled Inspection Assessment Report - This is a periodic report to program management which presents an assessment of how the inspection process is working. Through this report, management can make decisions and assign priorities regarding future inspections.

(4) Activity 4: Screen and Maintain Self Monitoring Reports

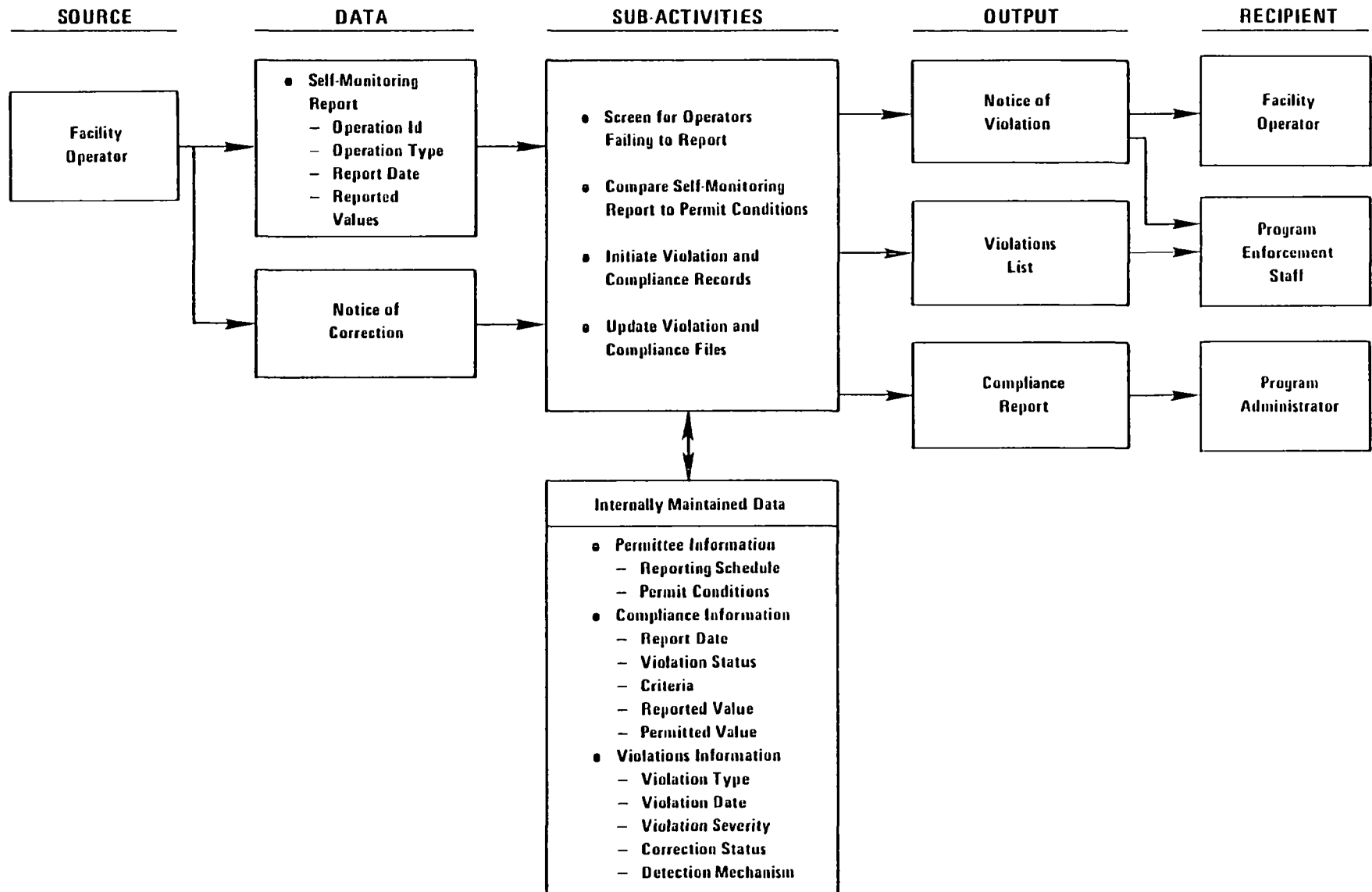
Exhibit V-6 presents the inputs, outputs, and subactivities required to screen and maintain operator self-monitoring reports. Activity 4 consists of two types of screening, a screen to determine if an operator has reported on schedule, and a screen of the operator's report to determine compliance with permit conditions. The major subactivities include:

- . Screen for Operators Failing to Report - Each operator is required to submit self-monitoring reports according to an agreed upon schedule. This subactivity consists of determining whether or not an operator's report has been submitted on the day it is due. This is done by screening a list of reports due on this date and determining if the report in fact has arrived.
- . Compare Self-Monitoring Report to Permit Conditions - This subactivity consists of comparing the values reported on the self-monitoring report to the values assigned in the operator's permit. These values may include pressure, volume, and total dissolved solids within the groundwater. Through this screening, possible operator violations or other problems can be highlighted along with previous operator history.
- . Initiate Violation and Compliance Files - When the inspection findings indicate a violation, this information will be used to initiate a Violations and Compliance record for the particular operation. This record will enable the program management to maintain a historical record of violations and compliance of each operator.
- . Update Violation and Compliance File - When corrective action is taken by the facility operator, the system will note this action through updating the violation and compliance record of that operator. The information which identifies the corrective action will come from either an inspector's report or an acknowledgement from the operator.

The inputs required by this activity include:

- . Operator Self-Monitoring Report - This is the report submitted by the facility operator which details the values obtained when the operation was monitored during the period. The information consists of operator identification,

SCREEN AND MAINTAIN SELF-MONITORING REPORTS



operation classification, reporting dates, and reported values.

- . Notice of Correction - Provides evidence that the facility operator has taken measures to correct what was in violation. It identifies the corrective action and the date it was taken. This data is used to update the operator's violation and compliance history.

The internally maintained information includes:

- . Permittee Information - This information includes the permit conditions and the self-monitoring reporting frequency.
- . Violations and Compliance Information - This internally maintained data file will contain a history of all violations by an operator. Included in the file are the type of violation, the date of violation, the severity, the correction status, and the mechanism of violation detection. Also included are the criteria which were not in compliance, the reported and permitted values of the criteria.

The output generated by this activity are:

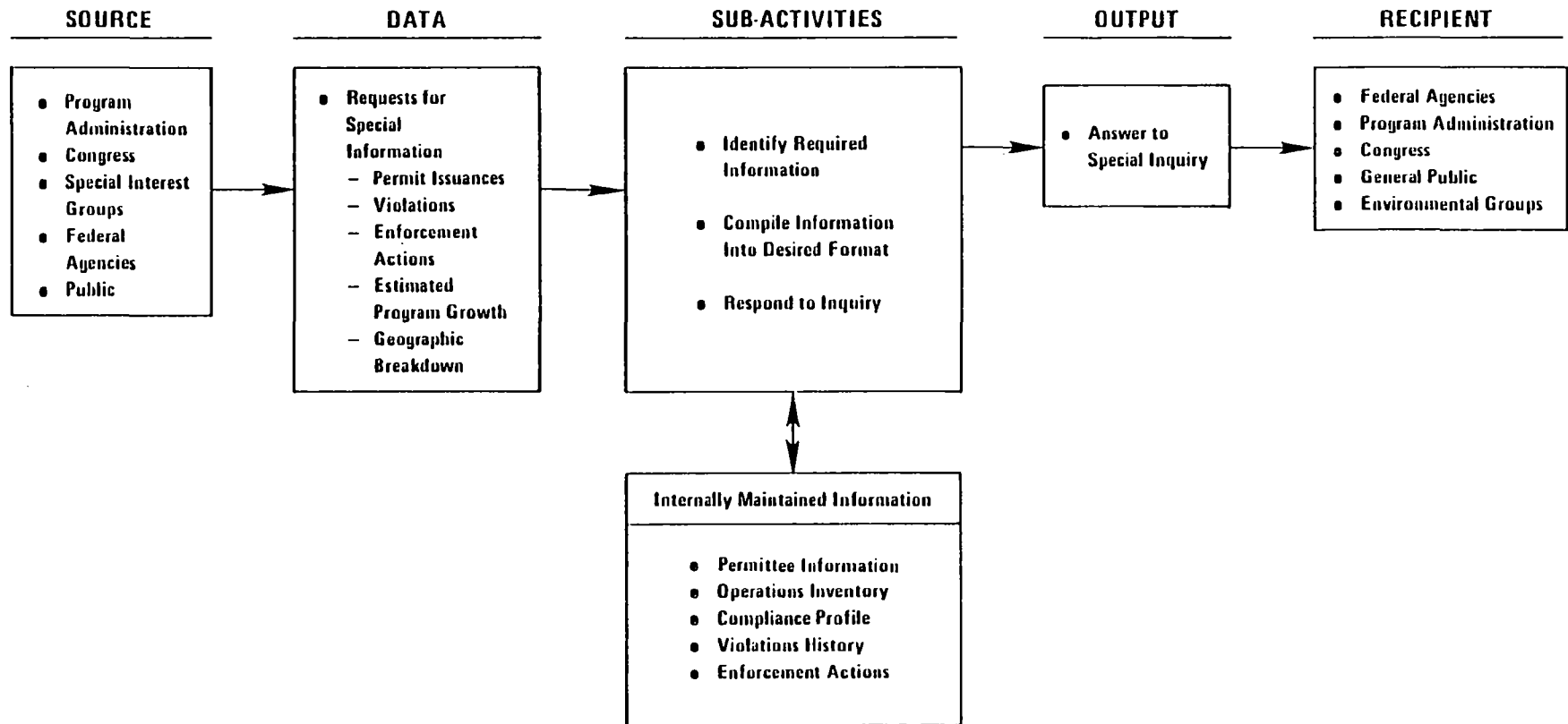
- . Notice of Violation - This information is sent to the facility operator with a copy to program enforcement. It is used to notify the operator of a violation and to initiate corrective actions.
- . Violations List - This is a list of all violations that were detected by those inspections conducted during the previous period. It provides the enforcement staff with a list of violations to follow up on.
- . Compliance Report - This is a report of the compliance activity during the period. It identifies non-compliance, the conditions which were violated, the overall number of compliance actions during the period and a summary of all inspection activity during the period.

(5) Activity 5: Answer Special Inquiries

Exhibit V-7 depicts the inputs, outputs, and subactivities required to answer special inquiries. Activity 8 will system support for requests for specialized types of information not currently provided to the various levels of program management. Major subactivities include:

- . Identify Required Information - This subactivity consists of determining the information required to satisfy special requests and identifying where the information resides.

ANSWER SPECIAL INQUIRIES



- . Compile Information into Desired Format - This subactivity consists of gathering the information once it has been located, and compiling the data into a format which facilitates its use by the requestor.
- . Respond to Inquiry - This subactivity consists of packaging the formatted response and delivering it to the requestor.

Input required by this activity consists of:

- . Request for Special Information - This is the request by interested parties which identifies what information is required, and may also identify the format it is to be presented in.

The internally maintained information required by this activity consists of whatever data files exist. It is from the UIC information system data files that these requests will be satisfied. These data files include:

- . Permittee Information
- . UIC Operations Inventory
- . Violations and Compliance Information
- . Enforcement Actions Information.

The output generated by this activity includes:

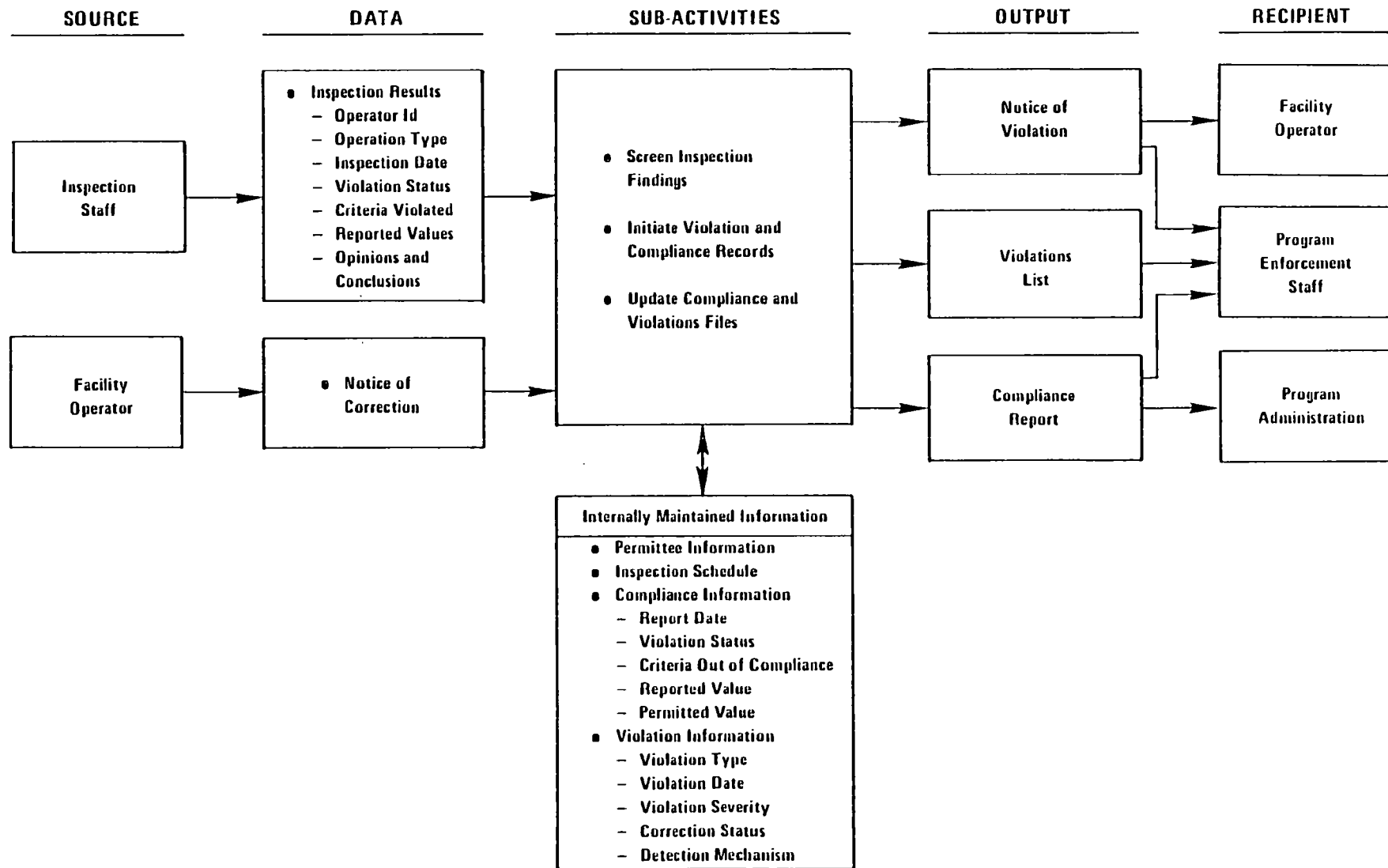
- . Answer to the Special Inquiry - Which is prepared and packaged in a format that facilitates its use by the requestor.

(6) Activity 6: Screen and Maintain Inspection Findings

Exhibit V-8 shows the inputs, outputs, and subactivities required for screening and maintaining inspection findings. Activity 6 is a manual process which screens the findings presented in the inspection report and initiates and updates compliance and violation history as required. Major subactivities include:

- . Screen Inspection Findings - This subactivity consists of manually reviewing the inspection report findings for completeness and accuracy, and screening the reported violations with respect to the permit conditions.
- . Initiate Violation and Compliance Record - When the inspection findings indicate a violation, this information will be used to initiate Violations and Compliance record for the particular operation. This will enable the program

SCREEN AND MAINTAIN INSPECTION FINDINGS



management to maintain a historical record of violations and compliance.

- . Update Violation and Compliance File - When an inspector's report or notice from the operator indicates that corrective action has been taken, an update to the Violations and Compliance file is manually prepared.

The inputs required by this activity include:

- . Inspection Results - The completed Inspection Report will provide the findings information that is the basis for initiating the violation and compliance records.
- . Permit - The hard copy permit will be used in conjunction with the inspection report to analyze compliance.
- . Notice of Correction - Provides evidence that the facility operator has taken measures to correct what was in violation. It identifies the corrective action and the date it was taken. This data is used to update the operator's violation and compliance history.

The internally maintained information includes:

- . Violation Information - This internally maintained data file will contain a history of all violations by an operator. Included in the file are the type of violation, the date of violation, the severity, the correction status, and the mechanism which detected the violation, the status of the violation, which criteria were not in compliance, the reported and permitted values of the criteria.

The output generated by this activity includes:

- . Notice of Violation - This information is sent to the facility operator with a copy to program enforcement. It is used to let the operator know there is a violation and to initiate corrective actions.
- . Violations List - This is a list of all violations that were detected by those inspections that occurred during the period. It provides the enforcement staff with a list of violations to follow up on.
- . Compliance Report - This is a report of the compliance activity during the period. It identifies non-compliance, the conditions which were violated, the overall number of compliance actions during the period and a summary of all inspection activity during the period.

(7) Activity 7: Initiate and Track Enforcement Actions

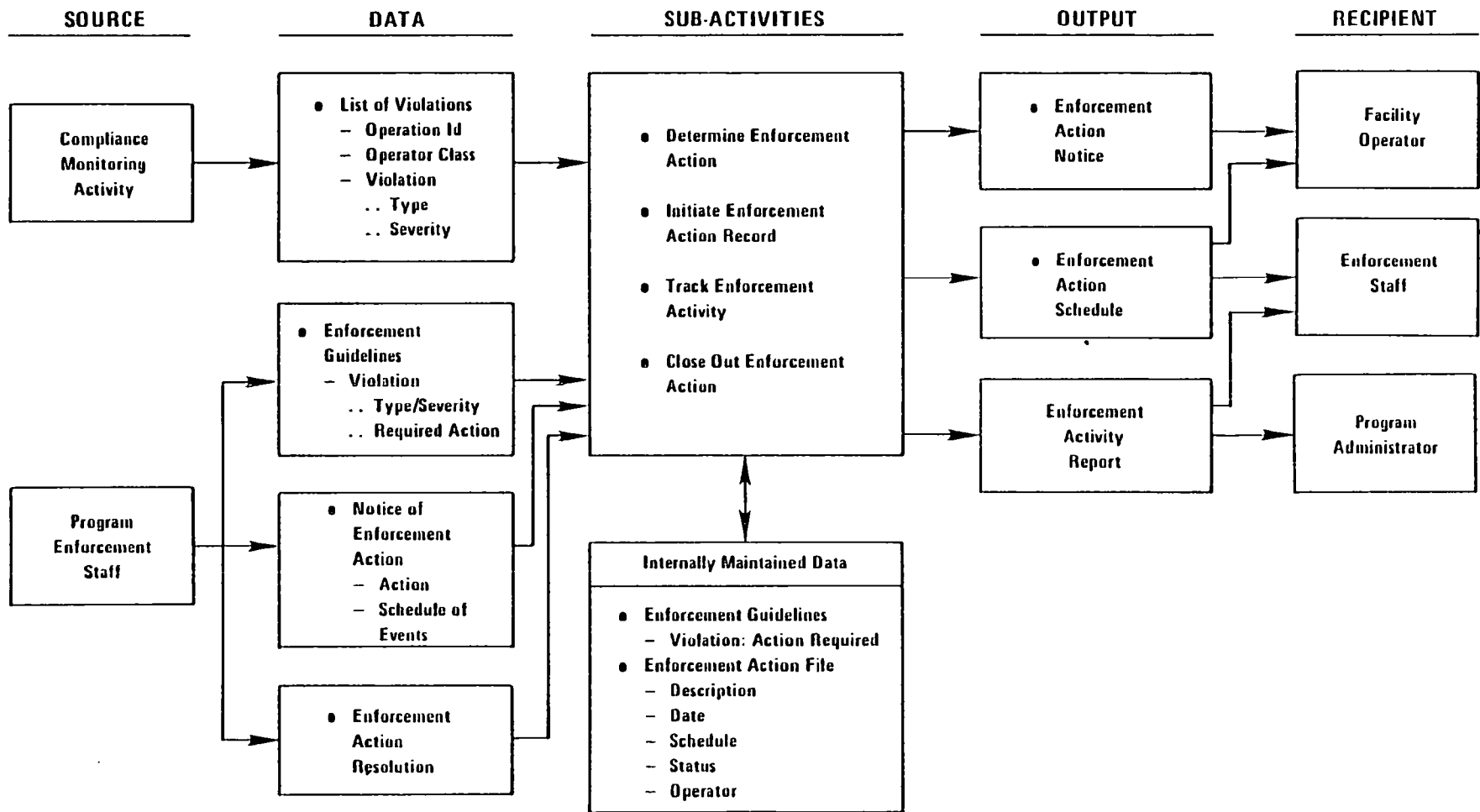
Exhibit V-9 shows the inputs, outputs, and subactivities required to initiate and track enforcement actions. Activity 7 is a manually performed activity which determines the required enforcement action based upon the violation, initiates an enforcement action file when the action requires time to complete, and tracks the status of the action until resolution. Major subactivities include:

- . Determine Enforcement Action - This subactivity consists of comparing the violation severity and type to a set of pre-defined enforcement guidelines and selecting the indicated action response. The enforcement guidelines are supplied by the program enforcement staff, and the list of violations is supplied by the program compliance monitoring activity.
- . Initiate Enforcement Action - In the event that the prescribed action is time-consuming, the enforcement staff will open an enforcement action folder in the enforcement action file in order to monitor the action from initiation to completion. In addition, a schedule for the enforcement activity is prepared. When the prescribed enforcement action is a phone call, this will not be necessary. All enforcement actions will be centered on a log indicating the action, actual or scheduled activity date, and status.
- . Track Enforcement Activity - This subactivity consists of periodically scanning the enforcement action log and schedule to identify upcoming events which must be addressed. It also involves preparing enforcement action notices for the enforcement action file and entering the date in the appropriate status column of the log when an event has occurred so that the enforcement action schedule and status log can be maintained.
- . Close Out Enforcement Action - This subactivity consists of moving the enforcement action folder to the closed file and entering the date in the appropriate status column of the log when the action has been resolved.

Inputs required by this activity include:

- . List of Violations - This information is supplied by the compliance monitoring activity and provides the necessary violation information to initiate an enforcement action.
- . Enforcement Guidelines - Provides the basis for determining the required enforcement action. This information is supplied by the program enforcement staff.

INITIATE AND TRACK ENFORCEMENT ACTIONS



- . Notice of Enforcement Action - Provides information about enforcement action event that has occurred. It is the basis for updating the enforcement action status log and is stored in the appropriate enforcement action folder.
- . Enforcement Action Resolution - This is the final enforcement action notice and initiates the enforcement action closeout process.

The internally maintained information in this activity includes:

- . Enforcement Guidelines - These are written guidelines to what action is required when a specific violation has occurred. While the list is not all inclusive, it is broad enough to allow responsive actions to be taken. The information relates an action to a specific type of violation with a specific severity.
- . Enforcement Action File - This is a hard copy file of enforcement action folders including action notices from initiation through completion. The information consists of action description, date, schedule, status, and who the action is against.
- . Enforcement Action Log - This is a log of all enforcement actions including action, scheduled dates for activities, and status.

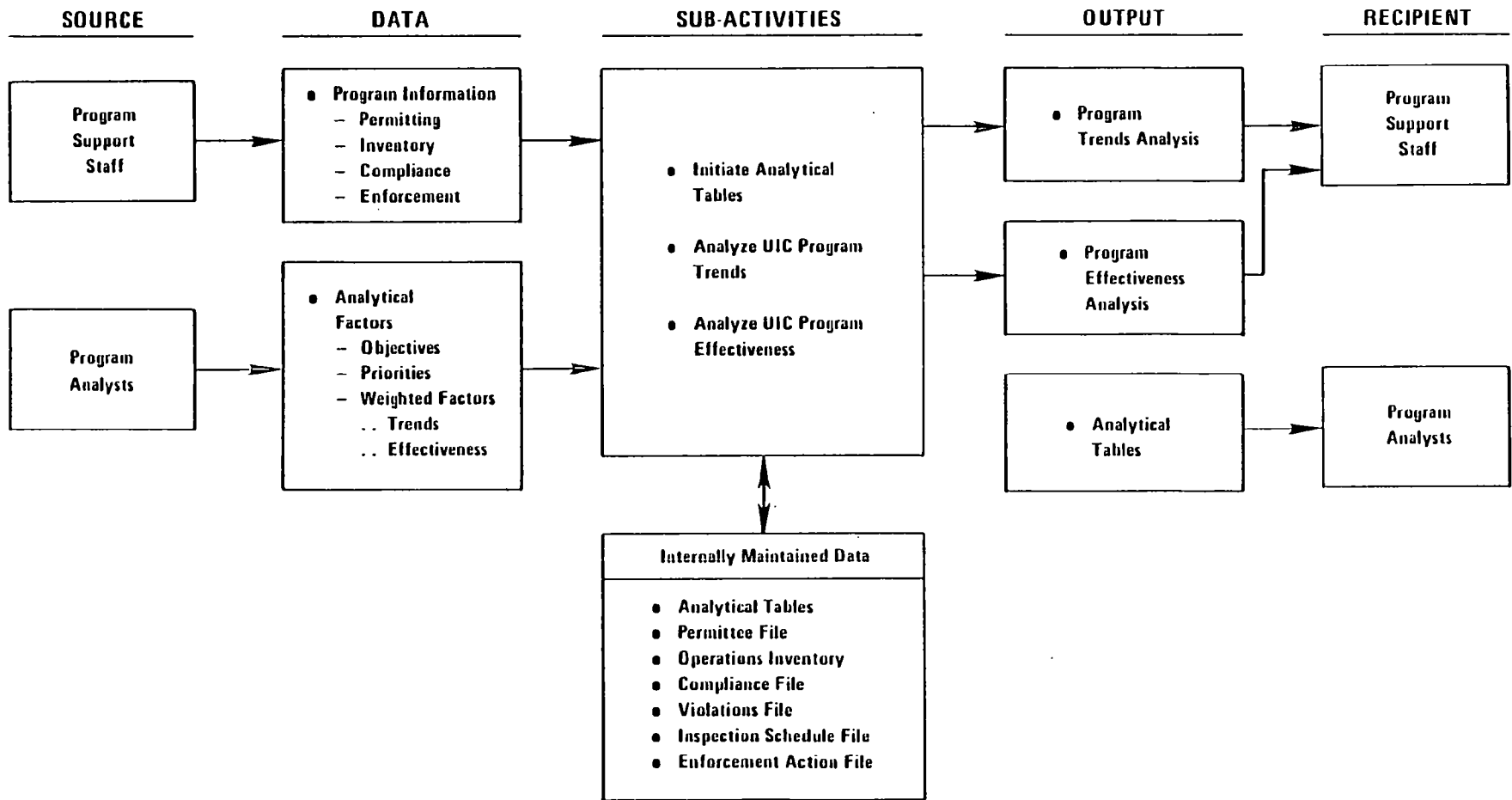
The outputs generated by the activity include:

- . Enforcement Action Notice - Provides the facility operator with a notice that an enforcement action is being taken.
- . Enforcement Action Schedule - Provides the schedule of events for a prolonged enforcement action. The information is provided to the facility operator and the enforcement staff.
- . Enforcement Activity Report - Provides information, both detail and summary, about open enforcement actions, their status, their schedule and other pertinent information. This report is compiled by the enforcement staff and a copy is forwarded to the program administrator.

(8) Activity 8: Analyze Program Effectiveness

Exhibit V-10 graphically depicts the inputs, outputs, and subactivities required to perform analysis of various aspects of the UIC program. Activity 8 performs statistical analyses of the UIC program to identify trends, assess the effectiveness of the various programmatic functions, and generally to provide program planners with information which will enable them to focus

ANALYZE PROGRAM EFFECTIVENESS



priorities for the next budget period. Major subactivities include:

- . Initiate Analytical Tables - In order to perform the statistical analyses, the program analyst will have to develop analytical formulas based on program objectives, priorities and functional goals. From these the analysts can develop statistical factors for evaluating trends and effectiveness. These formulas and factors will be maintained in a series of analytical tables which can be applied to the various analyses that will be performed.
- . Analyze UIC Program Trends - Using the previously developed analytical tables, the program analysts will periodically apply program information and perform trends analysis. From these analyses they will identify trends from a geographic standpoint, from an injection operation classification standpoint, from a functional standpoint including permitting trends, enforcement trends, compliance trends. These trends will serve as input to program planners for developing future program priorities and focal points.
- . Analyze UIC Program Effectiveness - Using the analytical formulas and factors, the program analysts can perform program effectiveness analyses. This is accomplished by measuring accomplishments to date against perceived goals and objectives by each function and the entire program. The analyses can provide a list ranging from most effective program area to least effective, and in this way aid program planners in establishing priority focal points of the program.

The inputs required by this activity includes:

- . Program Information - Supplied by the program support staff this includes up-to-date information on all aspects of the UIC program including permitting, inventory, compliance, and enforcement.
- . Analytical Factors - This information is supplied by program analysts and is the basis for the analytical tables. Included in the analytical formula development are program and function objectives, current priorities, and various statistical factors relating to trend computation and effectiveness assessment.

The internally maintained information required by this activity includes:

- . Analytical Tables - These tables consist of analytical formulas and statistical factors that will be applied in the program analyses computations. The information is supplied by the program analysts.

The output information generated by this activity includes:

- . Program Trends Analysis - This information identifies certain trends that the program is following both overall and by function.
- . Program Effectiveness Analysis - This information identifies how effective the overall program and the individual functions have been through the current period.
- . Analytical Tables - This is the current contents of the analytical tables. It provides the program analysts with an opportunity to periodically reevaluate the formulas and factors which make up the tables.

These are the activities required for an effective UIC management information system. The feasible alternative concepts which the system may take are described next.

2. SYSTEM DESCRIPTION

One approach for the recommended automated system is a sequential file data storage and retrieval capability to support key UIC inventory, permit, and violations monitoring functions. The previous section described the activities, both manual and automated, which comprise the UIC program administration function. This section addresses the software components and processing capabilities of the automated system. The system is comprised of five major functions. Each of these is discussed in the paragraphs which follow.

(1) Permit Tracking and Inventory Maintenance

The objective of this function is to store permit application and permittee information regarding status and permit conditions, and operations inventory data. The system creates a Permittee file whose primary data elements are listed in Exhibit V-11, and a UIC Inventory file whose data elements are listed in Exhibit V-12. The Permit/Inventory module is an edit/update program which reads and edits permit applications and award transactions. The module performs basic field and range edits and produces error lists and an error file of rejected transactions. Accepted data is used to update the Permittee file. When a permit is granted, the module automatically creates a record on the Inventory file. According to specified report selection criteria, the module records the permit file and creates report records on a report file. This file will be used by the report generation module to print the requested reports.

(2) Violations and Compliance File Maintenance

The objective of this function is to track violations and compliance actions. The module updates and accesses the

PERMITTEE DATA FILE

Permit Information Containing Key File,
 Operator Identification and Location,
 Operating Data, and Compliance Data
 (Used By all Functional Modules)

| <u>DATA ELEMENT NAME</u> | <u>TYPE</u> | <u>SIZE</u> |
|----------------------------|-------------|-------------|
| <u>Key Field Data</u> | | |
| State Code | N | 2 |
| Federal Region Code | N | 2 |
| Operation Identifier | AN | 12 |
| <u>Identification Data</u> | | |
| Owner - Name | AN | 30 |
| Owner - Address | | |
| Line 1 | AN | 25 |
| Line 2 | AN | 25 |
| Line 3 | AN | 25 |
| Line 4 | AN | 25 |
| Phone Number | AN | 10 |
| <u>Operations Data</u> | | |
| Operation Type | N | 2 |
| Operation Location | | |
| Latitude | AN | 7 |
| Longitude | AN | 7 |
| Location Within State | | |
| County | AN | 10 |
| City | AN | 10 |
| Section | N | 2 |
| Permit Basis | N | 1 |
| Number of Wells | N | 4 |
| Permit Issuance Date | N | 6 |
| Permit Renewal Date | N | 6 |
| Operation Status | N | 1 |
| <u>Compliance Data</u> | | |
| Criterion | | |
| Criterion Code | N | 2 |
| Criterion Value | | |
| Max | N | 5 |
| Min | N | 5 |

INVENTORY DATA FILE

Inventory of All Underground Injection Operations

| <u>DATA ELEMENT NAME</u> | <u>TYPE</u> | <u>SIZE</u> |
|----------------------------|-------------|-------------|
| <u>Key Field Data</u> | | |
| State Code | N | 2 |
| Federal Region Code | N | 2 |
| Operation Identifier | AN | 12 |
| Operation Type | N | 2 |
| <u>Identification Data</u> | | |
| Operation Location | | |
| Latitude | AN | 7 |
| Longitude | AN | 7 |
| County | AN | 10 |
| City | AN | 10 |
| Section | N | 2 |
| Permit Basis | N | 1 |
| Number of Wells | N | 4 |
| Operation Status | N | 1 |
| Permit Date | N | 6 |
| Date of Record | N | 6 |

Violations and Compliance file whose primary data elements are listed in Exhibit V-13. The module reads transactions from inspection findings and self-monitoring reports. Basic edits are applied to the data, error lists are generated and an error file of requested transactions is created. Accepted data is used to update the file. Upon request, the module will access the Permittee file to obtain permit conditions and will compare them to compliance data and previous compliance history to develop a variety of exception reports. These will be used to identify possible non-compliance or other problems.

(3) Federal Data Extract

The objective of this function is to provide the necessary input to the Federal Reporting System. This is summary level data from the Inventory, Permittee, and Violations and Compliance files. The module reads the data bases and builds a temporary file of selected data. The file of extracted data may be accessed directly by the Federal Reporting System or may be used by the Report Generator module to produce printed reports.

(4) Inspection Schedule Generation and Maintenance

The objective of this function is to provide inspection schedules. The module uses externally developed tables of frequency factors, and priorities, in conjunction with the Permittee File to develop inspection schedules which are stored in an Inspection Schedule file. Inspection schedules showing dates, are produced. In addition, upon request the module will scan the Violations and Compliance file which contains the inspection results and will compare it with the inspection schedule file to identify overdue inspection reports. The system can also accept and incorporate unscheduled inspection requirements.

(5) Program Report Generator

This is a generalized reporting module which produces most of the system reports. Accessing a report file containing records generated by the other processing functions, the module formats and prints hard copy reports according to report selection parameters. In addition, the module is intended to answer ad hoc queries. Basic structures for anticipated types of queries are programmed in the module. Input parameters direct the actual data selection. The module will scan the appropriate databases for necessary information and structure the requested report. It must be noted that this is not a totally generalized reporting capability, but represents a set of report types for which parameters can be supplied to dictate data selection.

(6) System Processing

VIOLATIONS AND COMPLIANCE DATA FILE
History of Violations and Compliance

| <u>DATA ELEMENT NAME</u> | <u>TYPE</u> | <u>SIZE</u> |
|-----------------------------------|-------------|-------------|
| <u>Key Field Data</u> | | |
| State Code | N | 2 |
| Federal Region Code | N | 2 |
| Operation Identifier | AN | 12 |
| Operation Type | N | 2 |
| <u>Violation History Data</u> | | |
| Violation Type | N | 1 |
| Violation Date | N | 6 |
| Violation Severity | N | 1 |
| Correction Status | N | 2 |
| Date Corrected | N | 6 |
| Detection Mechanism | N | 1 |
| Enforcement Action Identification | AN | 4 |
| <u>Compliance Data</u> | | |
| Self-Monitoring | | |
| Report Date | N | 6 |
| Violation Status | A | 1 |
| Criteria Violated | N | 2 |
| Value Reported | N | 5 |
| Inspection | | |
| Report Date | N | 6 |
| Violation Status | A | 1 |
| Criteria Violated | N | 2 |
| Value Reported | N | 5 |

A variety of processing cycles apply to different system functions. Monthly processing will include updates to the Permittee file with applications, permits, and permit modifications. Entry of granted permits automatically triggers an Inventory file update. Overdue applications reports will be produced. Inspection from transactions will also be entered on a monthly basis. Following update the inspection schedule and compliance file will be scanned to detect overdue inspection reports.

Self-monitoring reports will be received and entered on a quarterly basis. Following the update, exceptions will be reported. Annual processing includes generation of an inspection schedule for the coming year. The Federal Reporting System Extract file will be generated annually. Ad hoc or irregular cycles will accommodate entry of unscheduled inspections, and requests for reports.

3. IMPLEMENTATION PLAN

This section presents a plan for implementation of the recommended system concepts. The plan presents major steps, timing, and key considerations. The system implementation is comprised of three major phases:

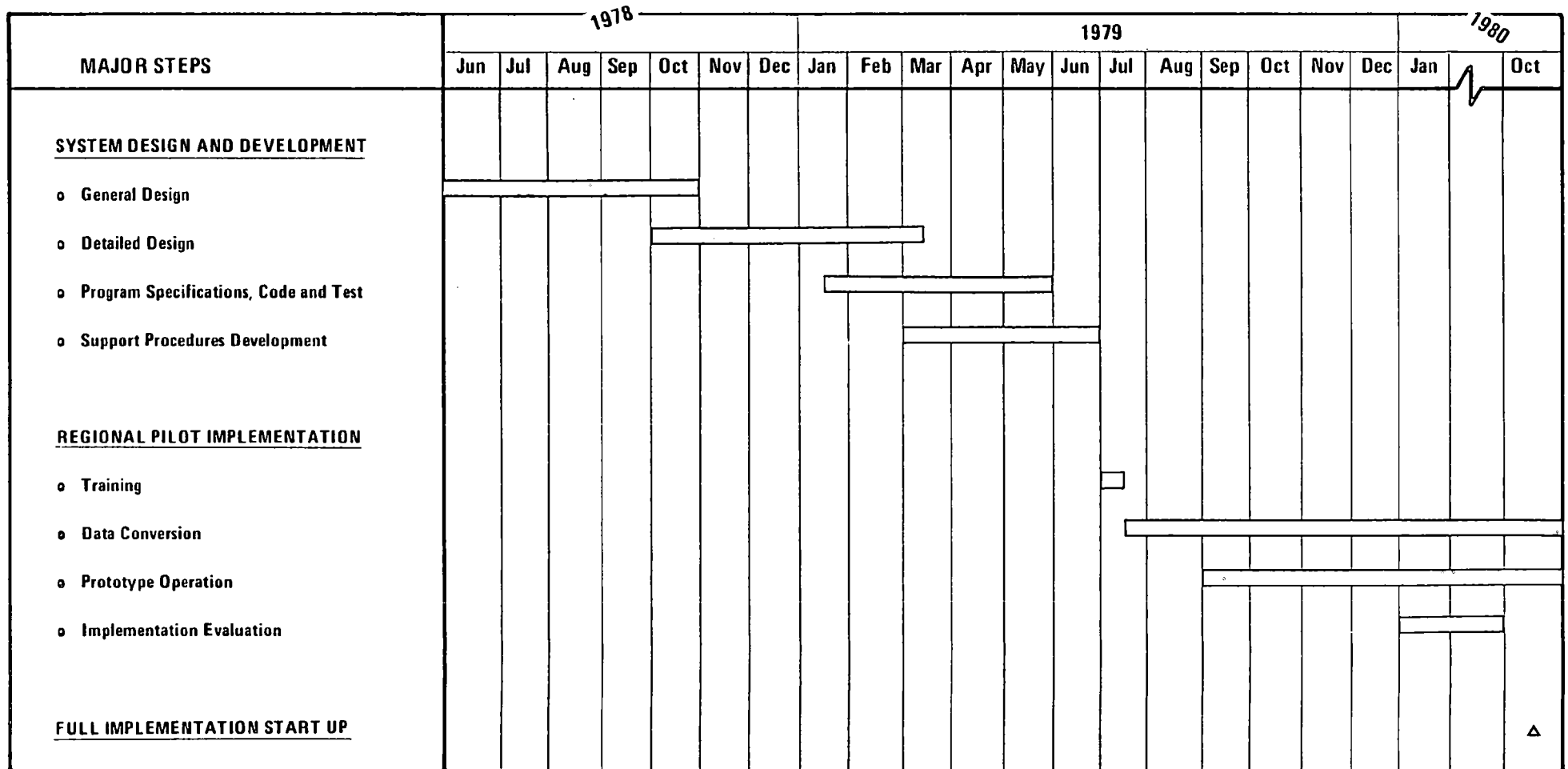
- . System design and development
- . Regional pilot implementation
- . Full implementation start up.

Exhibit V-14 provides a schedule for the major steps. Each of the phases is discussed in the paragraphs which follow.

(1) System Design and Development

The steps required to design and develop the recommended system concept are described below. We recommend that the Working Group including representatives of ODW, MIDSD, the Regions, and the States be used to guide this process. System design for the UIC information system is expected to occur in two phases. This two-phased approach is the direct result of the evolving regulatory environment of the UIC program. The first phase immediately follows the feasibility study and approval of the recommended system concept. The Phase I design called a general design on the Exhibit, will address the detailed logic, data elements, file structures, and processing controls which can be established on the basis of current knowledge and regulations. The design will be submitted for Working Group review so that it reflects consensus at that point. There will be a delay then, until the regulations are promulgated.

UIC MANAGEMENT INFORMATION SYSTEM IMPLEMENTATION PLAN



Upon promulgation of the regulations, detailed design activity will resume. Depending upon the nature and extent of changes to the regulations since completion of the generation design, some additional requirements analysis may be conducted. The design will be updated and all necessary detail provided. Program specifications development will commence followed by coding and testing. Support procedures which address manual handling of UIC data will be developed concurrently with automated system development. Based on assumptions regarding regulations promulgation and the extent of the changes to the design, the exhibit shows an operational system by June of 1979. Brief descriptions of the major design and development steps are provided below.

. Perform Detailed System Design

Having developed a system concept, the next step is to crystalize that concept into an operational system. A detailed system design is the mechanism for making the transition from a system concept to an operational system. From the system concept evolves the hardware requirements, and a master system flow. The detailed design effort consists of defining the data files and the system modules, developing specifications for each program and developing a system implementation plan. Thus, the detailed system design step consists of a series of separate tasks. These tasks are:

- Define the Systems Data Files

The purpose of this step is to fully define the system files which will be used by the modules of the system. These files have previously been identified in the system concept. The task involves defining each individual data element in terms of characteristic, size, and location within the record. Additionally, the record characteristics and file access method must be determined.

To assist in the documentation and maintenance of the system data files, we recommend development of a Data Element Dictionary for the system. The Data Element Dictionary is a means of identifying and defining the characteristics and location of the data elements contained within the system.

- Define System Modules

Having fully defined the data files of the system, the next required task is to define the individual processing modules that make up the overall system. Using the master system flow developed in the system

concept along with the system requirements and data files, we can determine the logical modules that will make up the system. These modules are then further grouped into programs and finally each program is assigned the function it will perform. When this is complete, the next task is to develop individual program specifications.

- Develop Program Specifications

At this point in the detailed design, we have defined the data requirements and the system modules for the system. We have also identified each program in the system and its function. We now must prepare individual specifications of each program. It is from these specifications that the programmers will write the programs. Specifications include input to the program, logical processes and output of the program.

- Establish Implementation Plan

At the same time that the program specifications are being developed, the plans for implementing the system must be prepared. This effort includes the following activities:

- .. Identify system implementation tasks
- .. Determine time-phased system testing pattern
- .. Identify manpower requirements necessary to implement, and break down implementation steps to the individual task level.
- .. Prepare system implementation document for distribution to personnel involved.

This task is the final task in the detailed system design step.

. Programming and Test

This step in the implementation plan consists of coding the individual programs to the assigned specifications. This programming effort includes writing the programs, compiling them and initially testing each program to assure it is doing what it is required to do. This initial testing of the programs usually involves the creation of test data which should reflect the live data that the system will process. It is during the initial unit testing of each program that test files are created. These files should reflect the characteristics required of the live data files.

An added test phase in this instance is the module test of the programs. These tests may involve several programs which comprise a module and they should be tested together to determine if the module is performing correctly. Finally, a system test will be conducted according to the test plan developed earlier. The objective is to assure that all functions operate properly in concert.

- . Develop Support Procedures

This step consists of the assembly, organization and documentation of all information describing the interaction of the user with the system. This involves the preparation of system and program documentation. In addition, user manuals for the various user/system interface points are prepared. Finally, system operating documentation is prepared for the run streams and parameter set-ups. This step is done in parallel to the programming and unit test step.

- (2) Regional Pilot Implementation

Although the system is expected to be operational by early June 1979, program activity in the form of Federal permit issuance and tracking, and self-monitoring reports is not expected to begin until about October 1980. In the interim, it is desirable to implement the system in one Region as a prototype. This pilot implementation will serve the purposes of:

- . Ensuring operational status of the system
- . Testing manual procedures and training techniques
- . Developing an experience base for future implementation.

The Region selected must be able to obtain data from a cooperating State that intends to use the EPA UIC system for program administration. If at all possible, the State should already have a UIC program, and must be prepared for the Federal reporting requirements to be imposed on the generators. The implementation will then proceed through training, data conversion, prototype operation, and implementation evaluation. Each of these steps is described briefly below.

- . Training

This step consists of training data entry clerks, senior analysts, supervisors, and senior ADP personnel from the Regional Office in the procedures for entering, analyzing and correcting data for the system. The training will be conducted at the Regional Office by members of the contractor staff.

- . Data Conversion

Inventory data provided by the cooperating State will be entered in the system. This activity involves reformatting the data as necessary and then loading it to the UIC inventory file. Reformatting may be a manual procedure if the state inventory files are not automated; or it may involve developing a translation routine to read automated State files and write the data in UIC file format.

- . Prototype Operations

Operators in the cooperating State will submit self-monitoring reports and Federal permit applications. These will be entered into the system according to established procedures. Inspection schedules will be developed and initial inspections made. In short, production operation will begin for the selected State program. All reports produced by the system will be carefully checked and file samples will be taken to ensure that the system is operating properly.

- . Implementation Evaluation

After the system has been operating for several months, an evaluation of the implementation will be made. The objective is to identify any system or procedural weaknesses, identify training techniques which need improvement, and assess the efficiency of the data conversion operation. Findings will be analyzed to determine what improvements need to be made prior to further implementation.

(3) Full Implementation Start-Up

At such an early stage it is not possible to determine the sequence of events for full scale implementation of the system. However, some factors which must be considered when planning the implementation can be discussed such as:

- . Limiting concurring activity in one Region
- . Integrating training where possible
- . Balancing manual data conversion with automated conversio.
- . Phasing in the automated capabilities of the system.

A likely scenario is a Region with two States wishing to use the EPA system for their own program and two or three States whose programs will be administered by the Region. It is important to limit the amount of concurrent activity in the Region to avoid confusion. Although in a centralized system the State will be

accessing the system directly, the Regional staff may well be called upon to help if problems arise due to their proximity. Therefore, it is necessary that a Region be aware of the timetable for all of its States with regard to the system and to plan its activities accordingly.

Another area where planning is needed is the training phase. It is certainly more efficient if all expected users of the system in a regional area can attend the same training session. However, if training is conducted at a time too far from actual system generation, it is largely wasted. Again, plans should be carefully reviewed and where sharing can be accomplished, group training sessions would be conducted.

The data conversion process will probably be the most demanding implementation activity. Some States will have automated data and some will not. In planning to implement several non-primacy States, the Region should consider whether data conversion is manual or automated. Even if manual conversion is performed by a contractor, there will be management responsibilities, quality assurance checking, and error handling which must be handled by the Region. It is suggested that only one manual conversion be attempted at a time. This could be paralleled by an automated conversion, if the automated conversion requires only a straightforward automated conversion program.

When the system is ready to be implemented at all selected sites, there will be a need to be able to manage and control the start-up operation. One way of accommodating effective management and control is to gradually phase in the automation capabilities. The system is somewhat unique in that it is designed in such a way that the various automated modules are for the most part independent of one another. In this way, it is feasible to initially bring up the Permit Tracking and Inventory Maintenance module at the outset so as to maintain the required inventory permit data. Then the additional automation capabilities such as Inspection Scheduling, Compliance Screening and File Maintenance and Special Inquiry would be gradually phased in, so that when the initial implementation and start-up is complete at all sites the system will be operating to its full capacity.

4. UIC FEDERAL REPORTING SYSTEM

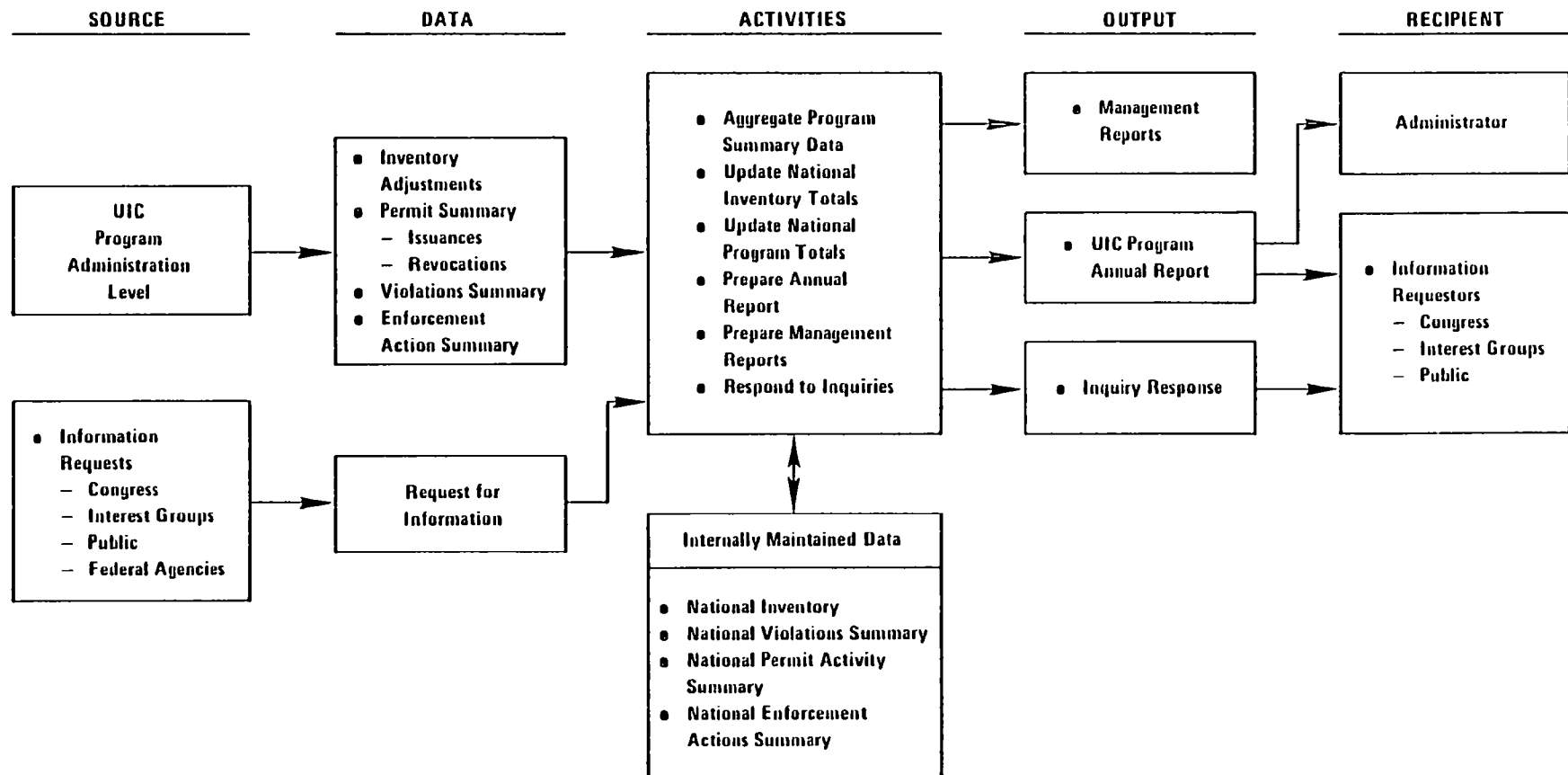
The UIC management information system that has been discussed is a system designed to support the program administration level. Current EPA regulations require submission of an annual report to the Agency by the program administering entities. This information will be provided from the data maintained in the UIC system. The repository of the incoming summary level information will be a Federal reporting system for UIC summary data. This UIC Federal Reporting System will be capable of generating the annual report, updating the National Inventory and maintaining summary information for other aspects of the UIC program such as permitting, violations and enforcement.

(1) System Descriptions

Exhibit V-15 graphically depicts the inputs, major activities, and outputs of the UIC Federal Reporting System. The primary function of the UIC Federal Reporting System is to support the information requirements of EPA Headquarters as imposed by the regulations, and as needed in its role of national program management. The major activities required by the system to support this function include:

- Aggregate Program Summary Data - On an annual basis, the UIC Federal Reporting System will receive summary level information from the UIC program administering entities. This information will include inventory, permitting, violations and enforcement actions data. This incoming data from the programs will be aggregated into a series of national totals for inclusion in the Annual Report and for file updates.
- Update National Inventory - Included among the incoming data are summaries pertaining to adjustments of the individual State inventories. When aggregated, these totals will be used to update the count in the National UIC Operations Inventory. These adjustments include additions, deletions, temporary status changes due to permit revocations or shutdowns pending compliance with regulations. The product of this activity is a current annual national inventory of UIC operations.
- Update National Program Totals - In addition to the summary of inventory adjustments, the aggregated information includes summaries of permit activity, violations and enforcement actions. This information will update the UIC Federal Reporting System data base which maintains program summaries by activity.
- Prepare Annual Report - By regulation, the program administering entities are required to report annually to EPA on the status of their program and the activity of the past year. The UIC Federal Reporting System will incorporate this information into an overall National Program Annual Report for the Agency.
- Prepare Management Reports - In addition to the Annual Report, the UIC Federal Reporting System will be capable of generating various national program management reports. These reports will serve to inform management of program effectiveness during the past year.
- Respond to Inquiries - In addition to the program management reports which are for internal Agency use, and the Annual Report which is intended for both Agency and external

UIC FEDERAL REPORTING SYSTEM FUNCTIONAL DESCRIPTION



viewing, the UIC Federal Reporting System will have the capability to respond to information requests from external sources such as Congress, special interest groups, and the general public.

Input required to support the major activities includes:

- . Inventory Adjustments - This information is required to maintain a current National UIC Operations Inventory. Included in this information are additions to the inventory to reflect new permitted facilities, deletions to the inventory to reflect operations which are abandoned, plugged, or permanently shut down, and status changes to existing inventory items such as temporary shut-down, suspension or permit revocation.
- . Activity Summaries - This information includes past year activity totals for permitting, violations, and enforcement actions. This information is used to prepare the National program management reports for EPA Headquarters.
- . Request for Information - It is anticipated that EPA Headquarters will receive requests for information concerning various aspects of the UIC program. These requests will most likely come from Congress, special interest groups, and the public. The information requested is likely to be of a summary nature, such as number of permitted facilities, number of violations, and other types of information.

The internally maintained information for the UIC Federal Reporting System will include:

- . National Inventory - The inventory of UIC operations will consist of minimal information for each operation. The information will include operation totals by classification and location. They will also include operational status totals.
- . National Violations Summary - This information includes totals by type of violation, total violations by location, and total violations by operation classification.
- . National Permit Activity Summary - This includes total permits issued, suspended, revoked and denied. Each set of totals will be by operation classification and location.
- . National Enforcement Actions Summary - This includes information on the enforcement actions taken over the past year. These totals are maintained by type of action, location of action and operation classification.

The output generated by this system includes:

- . UIC Program Annual Report - This report contains a summary of the past year's nationwide activities in the areas of inventory, permitting, violations, and enforcement actions. It is prepared for internal Agency distribution as well as public information to interested parties.
- . UIC Management Reports - These are a series of reports by activity which enable the cognizant Headquarters staff to ascertain the effectiveness of the activity from a national perspective.
- . Inquiry Response - These contain information related to the national UIC program, which has been requested by various parties.

(2) System Considerations

In developing the concept for a UIC Federal Reporting System, we focused on the information requirements of EPA Headquarters. These requirements were both required by the regulations and identified as being necessary by EPA staff involved in the UIC programs. The concept presented satisfies these information requirements.

Within the framework of this study of feasible alternatives for a UIC management information system for the program administrative level, we identified the system activities required by a system supporting the National program oversight function. These activities, as depicted in Exhibit III-6, are easily automated in their entirety. Therefore, we feel that the UIC Federal Reporting System should be a totally automated system, resident at an EPA national data center.

Finally, in order to be responsive to both administering entities and monitoring Regions which receive only summary data from primacy states, the UIC Federal Reporting System should be configured to accept a summary data file from the UIC management information system.