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**Management
Appraisal
Report**

November 1984

**Sacramento
Municipal
Utility
District**

By
LRS Consultants

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MANAGEMENT APPRAISAL REPORT

FOR THE

SACRAMENTO MUNICIPAL UTILITY DISTRICT

BY

LRS CONSULTANTS

355 West 14th Street
Idaho Falls, Idaho 83402

NOVEMBER 1984

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1.0 INTRODUCTION

As can be expected in any organization, there are significant strengths in the Sacramento Municipal Utility District (SMUD or District). As can also be expected, there are counterbalancing weaknesses, some of which result from the fact that SMUD is a public utility and consequently operates in a rigidly prescribed fashion in many matters, plus other weaknesses that result from the specific circumstances, history, operating character and environment of the District.

At the request of the Board of Directors, LRS Consultants Inc. (LRS) performed an in-depth appraisal of two aspects of the District's operations, namely the relationship between the Board and Staff, including general management, and the performance of the nuclear organization. This report is provided to summarize the results of that assessment. As is true in any evaluation of this type, the purpose of which is to provide recommendations for improvement, the report will appear to concentrate on problems, weaknesses and shortcomings. However, to provide balance and place the report in more appropriate context, strengths, good practices and strong points are also noted.

1.1 District Strengths

From an overall standpoint, reflecting the many years of dedicated service by Board members and employees, the District has a large number of strengths, in that it has accomplished the following:

- o Provided low electric rates for its customers - among the lowest rates in the nation.
- o Been appropriately innovative with its nuclear, photo-voltaic, geothermal and load management programs.
- o Provided excellent customer service with infrequent and short outages.

- o Developed a reputation for being an excellent place to work, with stable management, good benefits, dedicated employees and strong community acceptance.
- o Built a strong technical organization which is well respected in the public power community.
- o Fostered strong feelings of loyalty from the individual employee level to the general management level.
- o Developed or is developing a number of programs to enhance the District's ability to meet the challenges of the future, including resource planning, load management, five year planning with annual goals and objectives and plans for increased inter-tie capability.

1.2 District Weaknesses

A number of broad weaknesses exist which include some related to the nuclear program and some of which will be discussed more thoroughly in following sections. These weaknesses are as follow:

- o The relationship between the Board and the Staff does not always clearly demonstrate the common goals and objectives of each entity to work harmoniously so as to best serve the Sacramento area population.
- o Failure to clearly establish the roles, functions, needs and relationships of the Board, individual Board members, the General Manager and the District staff has resulted in internal confusion and an external perception of internal dissension.
- o Resource planning and load management appear to need additional emphasis.

- o District goals and objectives have not yet been implemented down to the supervisory and working levels throughout the entire organization.
- o The nuclear program is extremely short of senior and middle level experienced personnel and is too heavily dependent upon contractor forces at all levels.
- o District-wide, the industrial safety program does not appear to be achieving the kind of low accident incidence and injury incidence rates desired. In fact, these rates, which were already high in comparison with other electric utilities, have been increasing over the past three years.
- o The process of hiring of new personnel in the nuclear program suffers from being too time-consuming and not always being competitive with other nuclear utilities.
- o There is a district-wide need for improved training, including supervisory skills, and for an improved management development program.
- o Emphasis in the District, including the nuclear organization, is overreacting to faults with Band-Aid responses, rather than in curing the problem by correcting the system.
- o Rancho Seco Nuclear Generating Station (Rancho Seco) has become, or may always have been, an appendage to the District rather than an integrated part of SMUD.
- o Media relations has not received the attention it deserves. This is resulting in erosion of the SMUD image with the public and with many SMUD employees.

- o Several key organizations appear to be "one deep" in strength.

1.3 Present Challenges

The Sacramento Municipal Utility District has been going through some very trying times in recent years and has a significant number of challenges facing it today. Foremost among these is the need for improvement in the Rancho Seco operation, which has been exhibiting low plant availability over the past few years, as well as a wide variety of other problems, and appears to be justifiably receiving increased scrutiny from the Board, the NRC, and the news media. These problems will be discussed at length in this report. However, from a very broad perspective, it should be borne in mind that the Rancho Seco problems were developed over a number of years through the joint attitudes, efforts and performances of the Board and the staff. To a large degree, these failings were crystallized and surfaced through the necessity to respond to the increased post-Three Mile Island (TMI) changes to requirements on plant modifications, personnel performance, management systems, analytical capability, training and organizational structure. The regulatory response requirements of the Babcock & Wilcox (B&W) owners exceeded those of other types of nuclear power plants with unforeseen and unexpected hardware problems, like the auxiliary feedwater header replacement, which further burdened the SMUD organization. However, it is quite likely that the public power arena, with its primary focus on low rates as the election mandate of the consumers, played a significant role in the District's arrival at today's situation.

Other key problems facing the District are the generation and energy supply mix of the future, including follow-on to the PG&E contract, the Sierra Pacific inter-tie and conservation in reducing the peak energy demand. The consummation of the Northwest inter-tie on November 5, 1984 was a very significant achievement, which will provide valuable long term advantages to the SMUD customers.

Some key problems in the public arena are SMUD's image in the community, public confidence in the utility, media attitude and the relationship with the NRC.

The need to streamline the organization, to improve accountability at all levels, to implement succession planning, to convert to a pay-for-performance standard and to infuse some new outside blood and ideas into several levels of the management structure are all significant challenges.

1.4 Board/General Manager Situation

In the course of this appraisal, the opportunity was taken to interview at length each of the Directors, the top management of the District and various representatives from outside SMUD. These interviews were in addition to the extensive interviewing done in the nuclear organization and were for the purpose of developing a recommendation to the Board as to whether or not they should retain the present General Manager.

The attributes required of a General Manager to meet the present day challenges were developed, incorporating many of the job specifications that were utilized in the selection of the present General Manager.

Based on personal observations and the previously mentioned interviews, a summary evaluation of the strengths and weaknesses of the General Manager was developed.

A comparison was then made as to whether, on balance, the present General Manager should be retained. The conclusion was very clear that the present General Manager is qualified to continue as General Manager and that with cooperation and support from the Board, and appropriate public relations help, it would be difficult to find a

better qualified General Manager for SMUD's problems of today. Consequently, it is recommended that the General Manager be retained.

LRS has serious concerns regarding operations at Rancho Seco and believes the nuclear organization is presently highly stressed and troubled due to the following:

- o The SALP and PAS reports.
- o The recent operational errors that resulted in loss of expensive and vital equipment such as the circulating water and the canal pumps.
- o The steam accident.
- o The radioactive sleeve incident.
- o The control room/NRC region incident.
- o The declining performance of the Rancho Seco plant.
- o The public confrontations between the Board and Staff, including the General Manager.
- o The public statements to the media that John Mattimoe, Ron Rodriguez and Pierre Oubre should be fired.
- o The extreme pressures to improve performance in many areas.
- o The shortage of experienced and capable personnel available to respond to the demanding requirements of plant operation and maintenance.

Fundamental to LRS's making the many detailed corrective recommendations in this report was the assumption that there would be a sound and stable organization on which to build. A continuation of the unprofessional and argumentative relationship presently existing between members of the Board and the General Manager certainly undermines the desired organizational stability. If, in the near term, this undesirable Board/General Manager problem causes either the General Manager to resign or is the basis for the Board terminating him, LRS concerns regarding Rancho Seco operations would be escalated. The cause for these escalated concerns would be what LRS concludes would be a destabilization in the nuclear organization due to the following factors:

- o Deterioration in morale due to the personal loyalty John Mattimoe commands.
- o Amplification of the disrespectful relationship that exists on the part of plant personnel for the Board.
- o Concerns at the plant regarding the future of Messrs. Rodriguez and Oubre and the possibility of losses of a significant number of additional nuclear management personnel.
- o Concerns regarding the possibility that a replacement General Manager would be an outsider and not be experienced or knowledgeable in the nuclear utility field.

Consequently, in this circumstance, LRS would have to add a recommendation to interrupt continued Rancho Seco operation until at least the following corrective actions could be accomplished:

- o Develop and implement a SMUD nuclear organization concept similar to that included in the recommendations of this report.

- o Recruit and indoctrinate a significant number of key personnel having nuclear experience.
- o Redirect the company attitude toward Quality Assurance and strengthen the current organization and program.
- o Strengthen the training organization, develop required training programs, especially in the operations and maintenance areas and increase the level of training at all levels of the organization.
- o Develop a corrective action plan to implement all of the outstanding NRC, INPO and LRS recommendations.
- o Develop, approve and issue a new comprehensive clearance tag procedure.
- o Develop a list of critical drawings required for operation, revise these drawings and eliminate the use of uncontrolled drawings when completing critical plant operations.
- o Audit the operations and emergency operations procedures, develop a program to revise existing procedures and develop additional procedures as required to insure that all changes and modifications are included. In addition, insure that the procedures satisfy current regulatory and INPO standards.

1.5. Additional Recommendations

Assuming the Board of Directors accepts the preceding recommendation to retain and work with the present General Manager, some additional recommendations are provided to improve the Board/General Manager interface. These are intended to clarify the roles of the Board and the General Manager and to provide a well defined framework within which each party can perform its required function.

- BGM-1 The General Manager should be given an employment contract for a period of two or three years to reduce the continuing tensions that result from the "pleasure of the Board" tenure.
- BGM-2 Establish as soon as possible a written set of performance appraisal guidelines or objectives for the General Manager for joint General Manager/Board agreement.
- BGM-3 Prepare annual General Manager performance reviews in writing and present them to him as the consensus of the Board. Performance reviews must be objective and measured against clear performance criteria.
- BGM-4 Clarify the Board/General Manager working relationship in writing.
- BGM-5 Establish in writing what reporting is desired by the Board from the General Manager.
- BGM-6 Recruit at least one senior experienced outsider at the level reporting directly to the General Manager.
- BGM-7 Reduce the number of people reporting directly to the General Manager to 6 or 7.
- BGM-8 Increase the span of control of AGMs from 3 or 4 to 6 or 7.
- BGM-9 Planning should be initiated between the General Manager and the Board for the training and development of an individual to replace the General Manager when he retires.
- BGM-10 The title of Chief Engineer should be reassigned from the GM to an appropriate AGM.

- BGM-11 The Executive Director, Nuclear should be retitled an Assistant General Manager to clearly reflect the importance of the nuclear operation.
- BGM-12 Establish a suite of at least two offices on the fourth floor of the headquarters building with secretarial services, phones, desks, conference tables, etc. for Board members to use at their convenience.
- BGM-13 Establish a budget for the Board to be administered and controlled by the Board President with no requirement for GM approval of either the budget or expenditures.
- BGM-14 Establish a department reporting directly to the GM to handle Public Information, Board Liaison and Local, State and Federal Government Affairs. The Board liaison would include providing administrative (e.g. budget, schedule, clerical, meeting arrangements, etc.) support and assisting the GM in timely delivery of information.
- BGM-15 The Board members should attend American Public Power Association (APPA) Policy Maker Workshops similar to the one conducted March 1 and 2, 1984 which covered legal responsibilities, Board/Management interfaces, Board member authority and responsibility, Utility Financing Operations and Planning.
- BGM-16 Constituent or other complaints to Board members should be passed on to the staff in a neutral fashion for staff investigation.
- BGM-17 Complex items requiring staff evaluation brought to Board Meetings from the public should be submitted to the staff for comment and evaluation before Board comment.

BGM-18

The GM should solicit and the Board should provide written comments regarding AGM performance to the GM on an annual basis.

2.0 ORGANIZATION AND MANAGEMENT

2.1 Structure

The SMUD organization has some structural problems. One of these has been caused in part by the desire to provide high visibility and obvious top management support to fledgling departments in areas such as resource planning, budgeting and long range planning. Others appear to be the result of an artificial and not necessarily completely logical consolidation of departments under assistant general managers. For instance, the logic for Distribution Planning, Land, Consumer Relations, Energy Conservation and Utilization and several other departments reporting where they do is not readily apparent.

A more fundamental structural problem is that the General Manager has eleven managers, including AGM's, reporting to him and competing for his time. Conversely, the people reporting directly to the General Manager generally have only three or so managers or supervisors reporting to them. This structure, when combined with the participative management style required in today's business environment and practiced by the General Manager, makes for significant difficulty in finding adequate time for GM/AGM and other direct reports interaction, in obtaining prompt resolution of interorganizational problems, in obtaining GM decisions and in coordinating efforts among several departments. An offshoot of this last item is the proliferation of committees that the District utilizes as a part of its decision making process - to the detriment of sound line management.

In summary, it is clear that the overall SMUD organizational structure can be streamlined to obtain more effective utilization of the General Manager's time, to broaden the scope and experience of a

lesser number of individuals reporting directly to the General Manager, thus developing a replacement GM for his time of retirement, and to improve the delegation process.

Within the nuclear organization two fundamental structural problems appear to exist; namely, that the bulk of the SMUD in-house effort is concentrated under one manager (resulting in an extremely heavy load on him and a very lopsided structure) and the limited number of individuals that the Executive Director, Nuclear can call on directly in accomplishing his mission. A result of this present narrow structure is evidenced by the paucity of senior personnel available for the various mandatory support efforts required in today's nuclear environment. A set of organization charts that could be considered are shown in figures 2-1 through 2-7. Obviously, these are not intended to represent the only way of organizing, but to show one way of improving the present organization. Some specific comments related to each chart follow:

- o Chart 2-1. Nuclear Organization. In the overall nuclear organization, the Executive Director, Nuclear has been elevated to Assistant General Manager, Nuclear and a senior Technical Staff Assistant is shown. This latter position provides the opportunity to recruit an experienced, senior level individual or utilize one of the present personnel and recruit for an additional senior line manager to improve the depth of the organization. It should also be noted that the expansion from three to six departments provides an additional opportunity to broaden the District's nuclear capability by recruiting supervisor, superintendent and manager level individuals from outside of SMUD.

Licensing and Compliance have been elevated to the department level to reflect the importance of this function in today's environment. In addition, by reporting directly to the AGM, Nuclear, it is possible to be more directly reflective of

District position, to assure the close involvement of top management in licensing issues and to reduce the possibilities of disconnects in District policy between headquarters and the plant.

The Plant Manager (formerly Plant Superintendent) has been elevated to the department level for several reasons as follow:

- 1) To better reflect the importance of the Rancho Seco plant and its management to the District.
- 2) To improve the ability to recruit personnel throughout the plant in present areas of shortages or weaknesses.
- 3) To provide a better opportunity for top management to influence and guide plant operations and simultaneously to provide a shorter path to get significant plant problems to the attention of top management.

A Technical Support Department has been created to separate the functions that are directly required to operate the plant from those that are required to support the operation of the plant. The separation proposed should allow a more logical distribution of load than that in existence and again provides the opportunity to recruit some senior and experienced personnel to bolster the District staff by elevating a number of functions in the present organization.

Establishment of an Administrative Support Department further relieves the various line managers from functions that detract from their primary job and also provides a more direct support to the AGM, Nuclear.

- o Chart 2-2. Quality Assurance Department. Quality Assurance (QA) would still report to the same level. However, the department would have a more formal structure than at present. Site QA would include audits and surveillances of the operations, maintenance and construction activities and performance of inspection planning as necessary. The administration and audit section would include the normal administrative duties for the department and the performance of the MSRC audits and the vendor qualification and audit programs. The quality engineering section would perform trending and commitment tracking, provide MSRC support, provide training programs and certification of special process personnel, review subcontract and purchase orders to assure inclusion of quality requirements and prepare and maintain the QA Manual and associated procedures and instructions. Of course the non-nuclear QA group would remain unchanged.
- o Chart 2-3. Nuclear Engineering Department. The structural changes recommended are removal of Nuclear and Analysis, Licensing and ALARA from the Engineering Department.
- o Chart 2-4. Licensing and Compliance Department. This department would be structured to handle long range and immediate licensing related issues, would include commitment control and tracking functions and would be charged with improving the present relationship that exists between SMUD and the NRC. Consolidation of licensing aspects that presently reside in headquarters and the plant, as well as integrating the contacts with the various interfaces at the NRC regional and headquarters organizations should result in improved relations between SMUD and the NRC. In addition, a nuclear and analysis function has been added to this department, which would include fuel management and the nuclear engineering function now in E&QC.

- o Chart 2-5. Rancho Seco Plant Department. The major structural changes recommended here are the separation of radiation protection and chemistry, the addition of the ALARA function from NED and the addition of outage planning and management which includes construction.
- o Chart 2-6. Technical Support Department. This new department would provide required additional emphasis to the very important training function, would provide the day-to-day plant engineering support required by the plant and would relieve plant management of many peripheral burdens. One additional important change is the incorporation of Quality Control from a plant function to an external function. The reasons for this recommendation include the need to elevate and consolidate the inspection function and to make it more independent of any operating, maintenance, construction or scheduling pressures. In addition, security and warehousing which require technical expertise are included in this organization.
- o Chart 2-7. Administrative Support Department. The establishment of an Administrative Support Department is simply a recognition of the organization necessary to handle the requirements of the administrative burdens placed on a utility by the highly regulated and proceduralized operation that must develop and maintain records, control design documents and vendor data, as well as the normal administrative requirements.

2.2 Management Systems

There are a number of systems, including such well known ones as management by objectives that are used by present day organizations to manage increasingly complex technological operations. The District has, in recent years, implemented several such programs aimed at improving the overall performance of SMUD. Some of the more significant management programs are discussed briefly in the following paragraphs.

2.2.1 Goals and Objectives

For several years, the District has had overall goals and annual objectives, which have been adopted by the Board and are contained in each Five Year Business Plan. At least one organization has in the past developed subordinate objectives to support the District goals and has carried this down through the department level and is now carrying it down one additional level each year with the aim to include all exempt employees. This will prove useful in the pay-for-performance program.

The General Manager has implemented a requirement very recently to obtain departmental objectives that relate and contribute to achieving the District objectives.

Several shortcomings are seen in the present program as follow:

- o The District-wide goals do not in all cases have 1985 objectives.
- o The number of 1985 District objectives are very limited and in some cases do not appear to be stretch targets.
- o There does not appear to have been much accountability for performing to objectives in the past and there is some indication that annual objectives are dictated to departments rather than being mutually agreed upon.

2.2.2

Personnel Management

The comment has been made by previous auditors, including NRC and INPO, that the SMUD nuclear program has no depth in experienced personnel. It appears that this comment could be made about a number of other areas in the District that are felt by the SMUD staff to be "one deep" in many critical positions.

There does not appear to have been any effective succession planning accomplished over the years. Although there are some supervisory and management training opportunities presented, there does not appear to be a well rounded management development program which would include cross training to broaden individual capabilities. With such a program the potentially narrow focus of replacements for AGMs and the GM could be eliminated.

Recruitment of outsiders to fill staff vacancies appears to be a time-consuming and frequently frustrating experience. In the nuclear arena this is due in part to the extensive competition for qualified personnel from other operating utilities and, even more so, from the near term operating license utilities, which must staff up to convince the licensing boards that they are ready to operate. A reluctance was expressed by some individuals to hire when they could use contractors because it was so difficult to get rid of poor performers under Civil Service. This results in a very expensive way of operating since these outsiders characteristically cost about three times what an employee would cost and do not have the motivation to control other costs.

Many benefits other than salary are utilized by utilities in today's environment to recruit personnel. The District has liberalized some of its policies to compete in this market. It is apparent that SMUD is not yet competitive since a number of key recruitment efforts have failed recently.

A number of position descriptions were reviewed. They appear to be well done and clear. They also appear to be available throughout the organization.

The Engineering Personnel Committee reviews and approves all engineering candidate selections and thus has a very strong influence on all promotions to engineering grades in the District.

An unusual requirement exists at SMUD that anyone who is promoted to, or holds the title of, Senior Engineer must have a professional engineer's license. Although, on the surface, this may seem like a reasonable requirement, there are many positions in nuclear areas that are equivalent to those of the conventional engineering disciplines and have no technical reason to require the professional engineering license.

2.2.3 Corrective Action Programs

There has been criticism in the past, that was apparently justified, regarding the nuclear organization's failures to respond to negative findings of auditing agencies. It now appears, especially with regard to the findings of the NRC's performance appraisal of late 1983, that the

District has developed a corrective action plan for each citation, has assigned a responsible individual and established a completion date.

The PAS team has done a very thorough job of evaluating the Plant Review Committee (PRC) and the Management Safety Review Committee (MSRC) and has provided numerous citations of shortcomings. Therefore, LRS does not feel that duplication in this area was necessary and, instead, concentrated its efforts in other areas. However, the District responsiveness to the findings and the actual correction of deficiencies were sampled. It is concluded that the corrective actions in this area have been quite good and many items have already been completed.

To assist the MSRC in its safety oversight, trend analyses of a wide variety of performance indicators are conducted annually. The trend analysis report for 1983 is an excellent example of this management tool. In fact, it is one of the best trend reports that LRS has seen. However, it does not appear that line management has responded to the adverse trends indicated in this and prior reports.

In response to the steam accident, the nuclear organization has implemented several specific corrective action programs in some areas that were felt to require improvement. These included areas such as local emergency response and the work request and clearance procedure. This incident should be thoroughly evaluated to assure that any deficiencies flagged by this incident in training, work control, systems understanding, craft supervision in the field and emergency response are corrected.

2.2.4

Industrial Safety Program

The SMUD history in industrial safety is not good. For instance, according to an internal memo, in 1981, SMUD's lost time incidence rate was 1.3 times higher than Nashville Electric (1,100 employees), 1.6 times greater than Memphis Light and Gas (1,500 employees), 2.8 times higher than Salt River Project (4,500 employees), and 4 times greater than Nebraska Public Power (2,100 employees). Santee Cooper (an electrical utility in South Carolina with 1,100 employees) went the entire year without a disabling accident. When the District's safety record is compared with DuPont, which has one of the best safety records of any organization, it is found that a SMUD employee is 50 times more likely to have an accident than a DuPont employee. The DuPont organization, like most other firms, has found that 96 percent of employee injuries are the result of unsafe acts.

The available data indicate on a District-wide basis that less than acceptable personal injury and accident rates continued into 1983 from 1982 with percentage increases in 7 of 8 categories ranging from 12% to 96%. Preventable vehicle accidents reported was the only item counter to this trend with a decrease of 21%. As of September, 1984, the days lost incidence rate was up nearly 300% over 1983, the disabling injury incidence rate was up 63%, and the number of days lost was up 104%.

At Rancho Seco, an annual average of one person sent to the hospital for every 29 badged employees for the years 1980 through 1983 and a sharply increasing number of persons per year being sent to clinics are also disconcerting statistics.

One of the most important factors in reducing industrial accidents is to get supervision out into the field to observe and correct unsafe conditions or acts. A number of programs exist to reduce industrial accidents. Some of these programs are "canned", readily obtainable and quite inexpensive.

2.2.5 Project Management

A study is presently being completed by a contractor that can provide guidance to SMUD in the development of a project management capability. Such a system can be very useful to the District.

2.2.6 Committees

At the present time the District has nearly sixty inter-departmental committees. Some key people in the nuclear organization, for instance, are on as many as six or eight committees. These activities, while they may be beneficial for coordination of information, detract from the time available to carry out managers' line responsibilities.

2.3 Recommendations

In addition to the broad organizational recommendations made in the introductory section, a number of specific recommendations in the area of organization and management are as follow:

OM-1 The departments reporting to each Assistant General Manager should be based on similar or complementary functions.

OM-2 Consideration should be given to reorganizing the nuclear organization along lines similar to those described in Charts 2-1 through 2-7.

- OM-3 The program of goals and objectives should be amplified and strengthened, including more objectives and ones that are more challenging. Accountability for supporting overall District goals should be required at all levels in the organization.
- OM-4 Develop and implement a District-wide succession planning program.
- OM-5 An improved program for recruitment of key personnel should be developed and implemented.
- OM-6 A long range goal of eliminating contractor forces from the nuclear operation, except for peak requirements, should be adopted and a program to accomplish the goal developed and implemented.
- OM-7 The requirements for an Engineering Personnel Committee approval of engineering promotions and the requirement for professional engineer licenses for all Senior Engineer positions should be reevaluated.
- OM-8 Corrective action to audits such as the PAS and SALP reports need to be thorough, substantive and carried through to completion.
- OM-9 Internally generated analyses or evaluations of trends, incidents or accidents should be very thorough and objective and result in definitive recommendations as well as prompt and effective corrective action.
- OM-10 A sound accident prevention program that has the added incentive of getting line managers, supervisors and foremen out into the work place more frequently should be implemented.

OM-11

The number of standing committees should be reduced significantly and the participation on the part of any individual AGM or Department Manager should be limited to no more than about 2 or 3 committees.

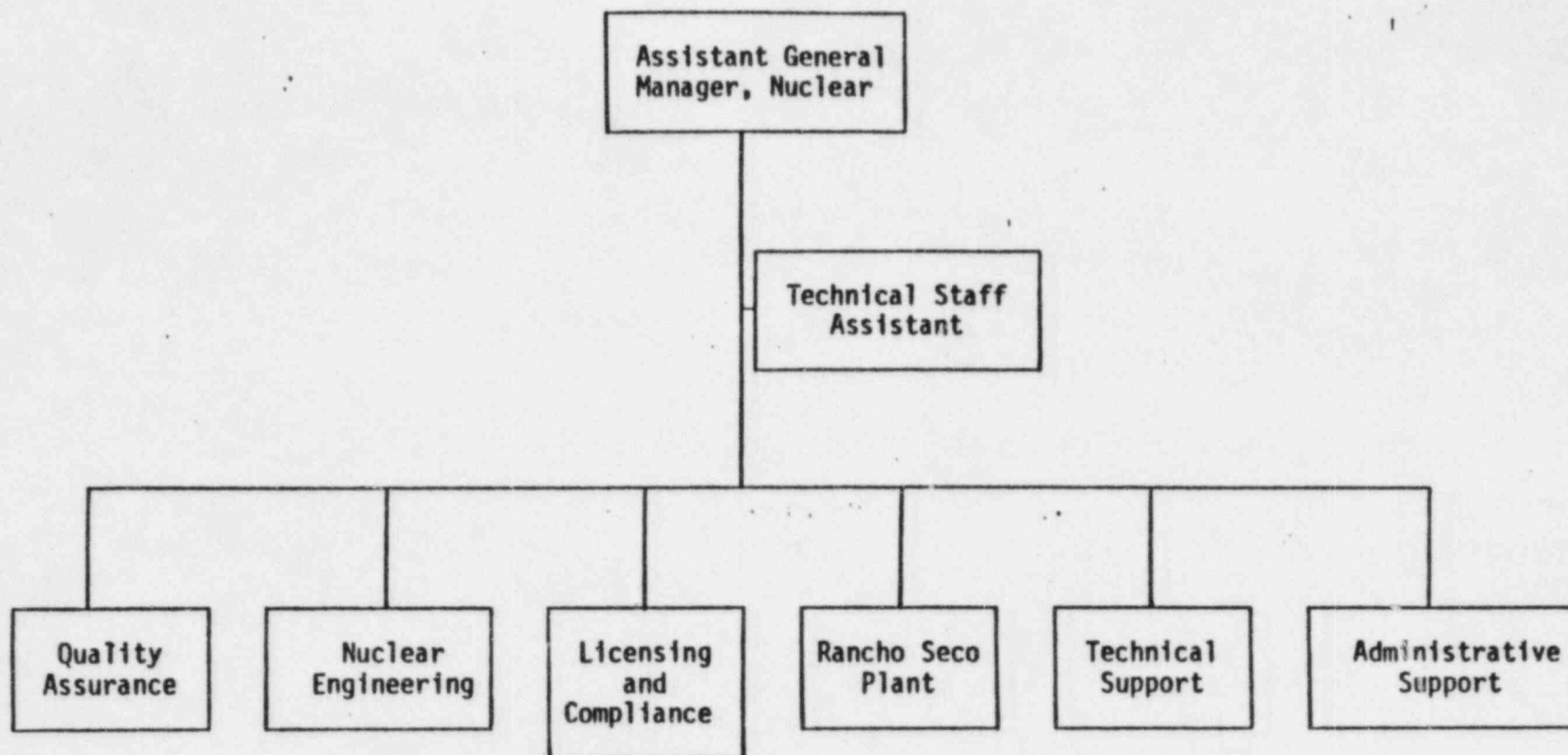


Chart 2-1 Nuclear Organization

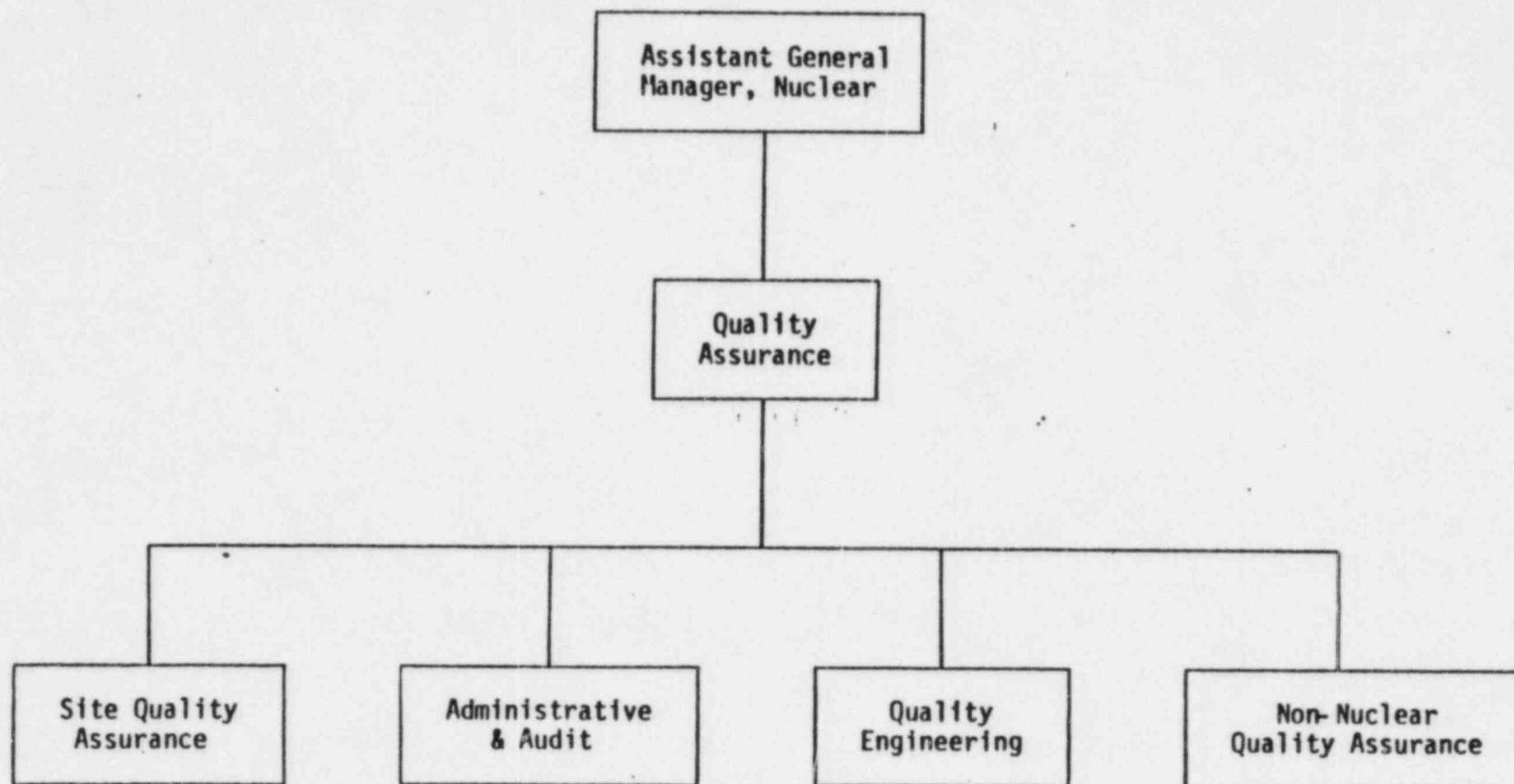


Chart 2-2 Quality Assurance Department

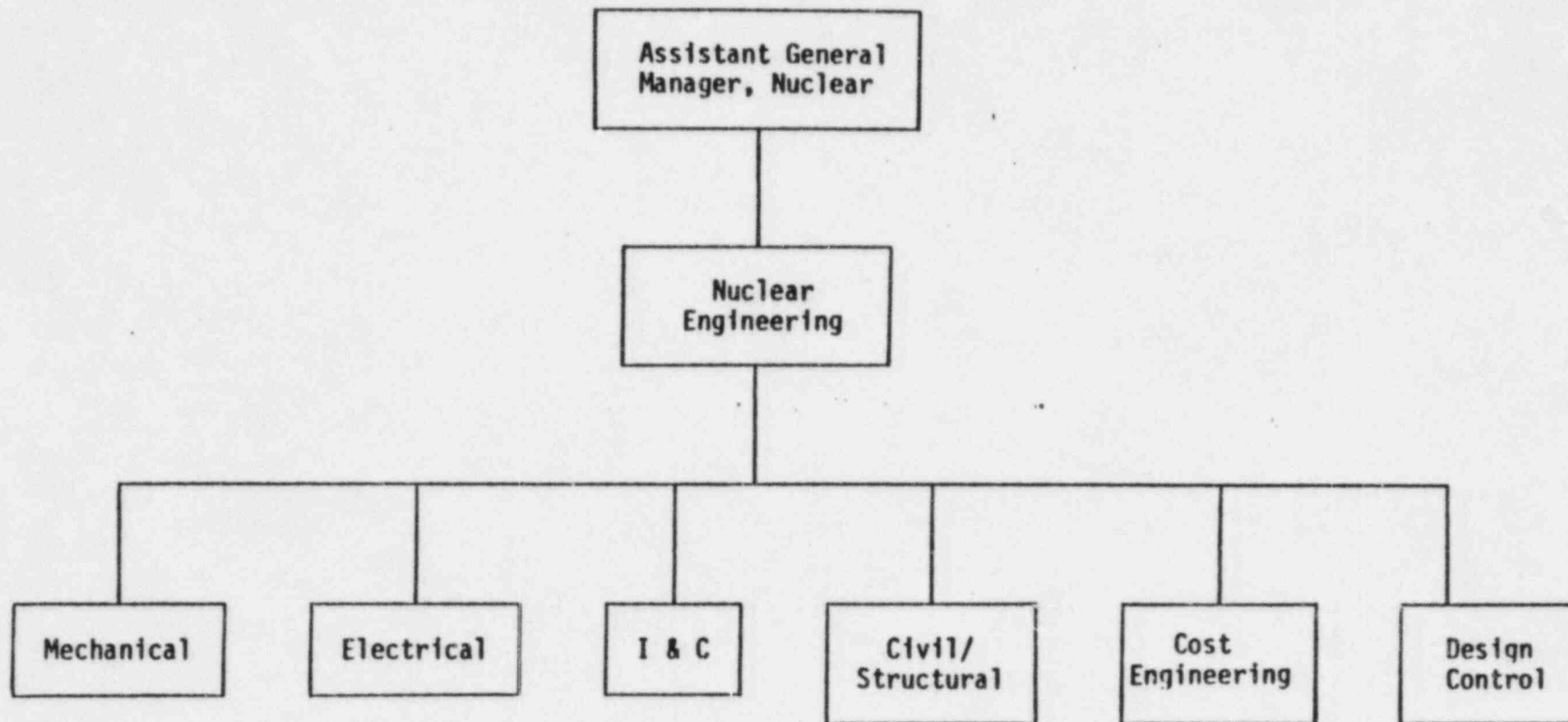


Chart 2-3 Nuclear Engineering Department

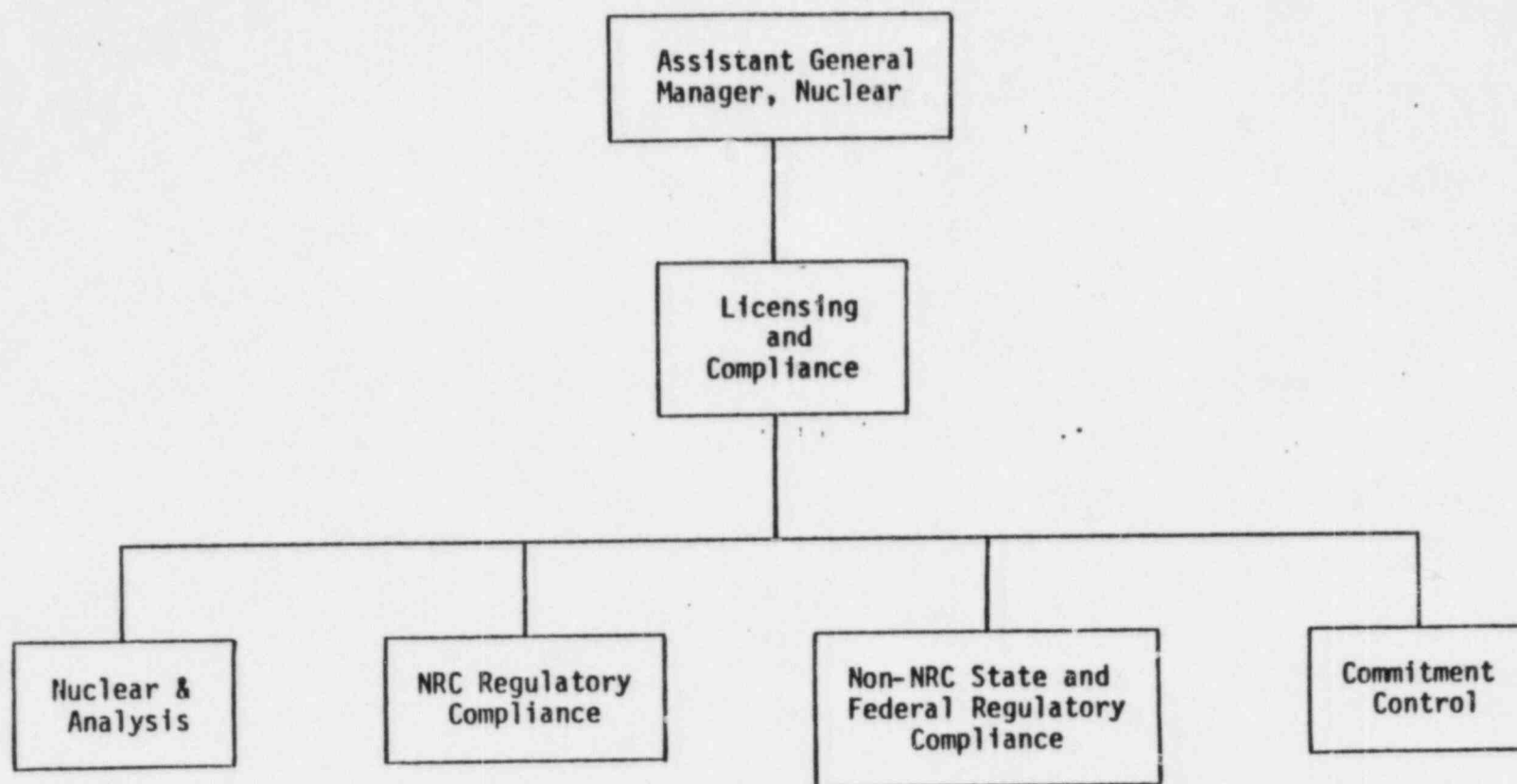


Chart 2-4 Licensing and Compliance Department

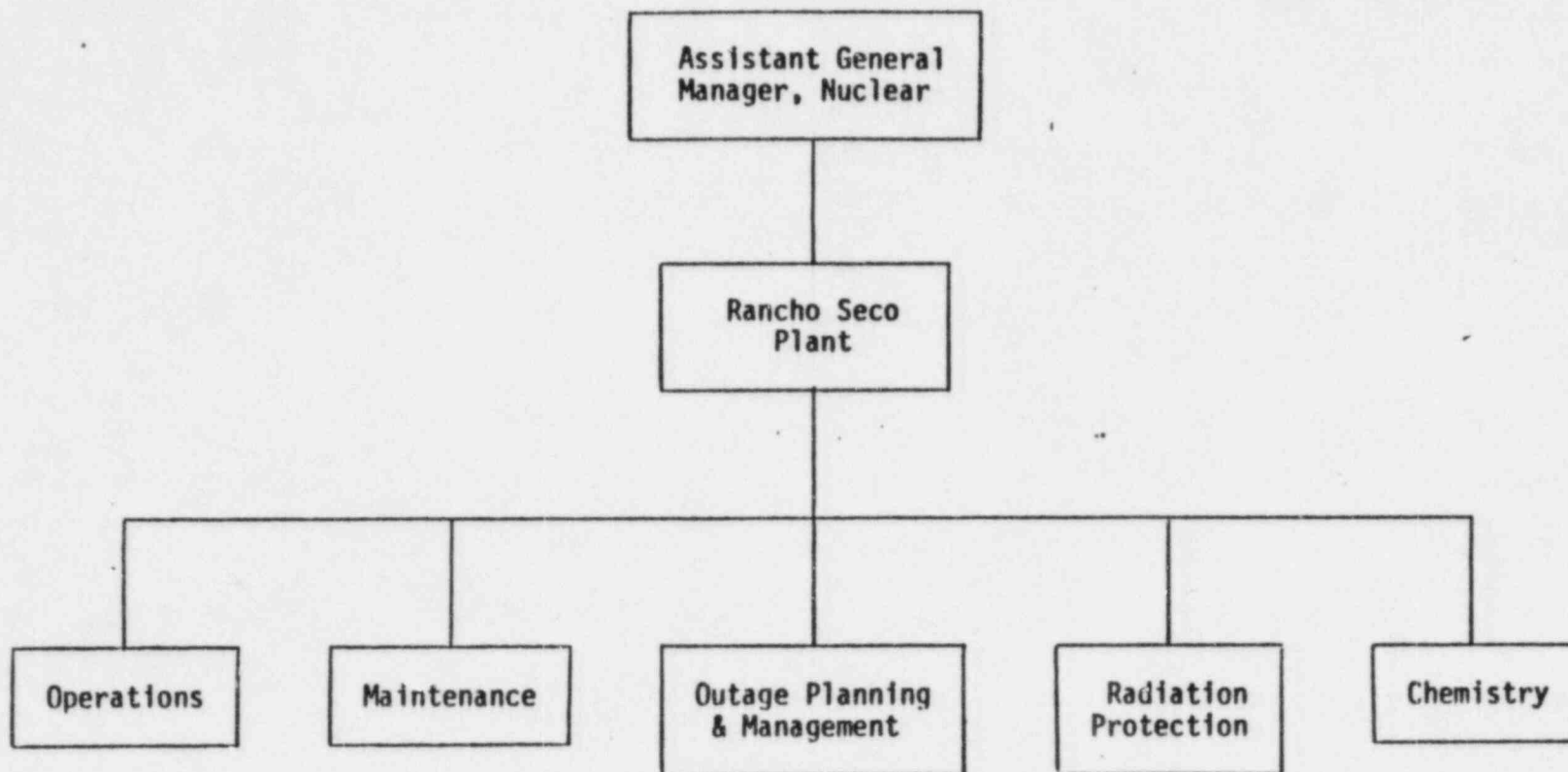


Chart 2-5 Rancho Seco Plant Department

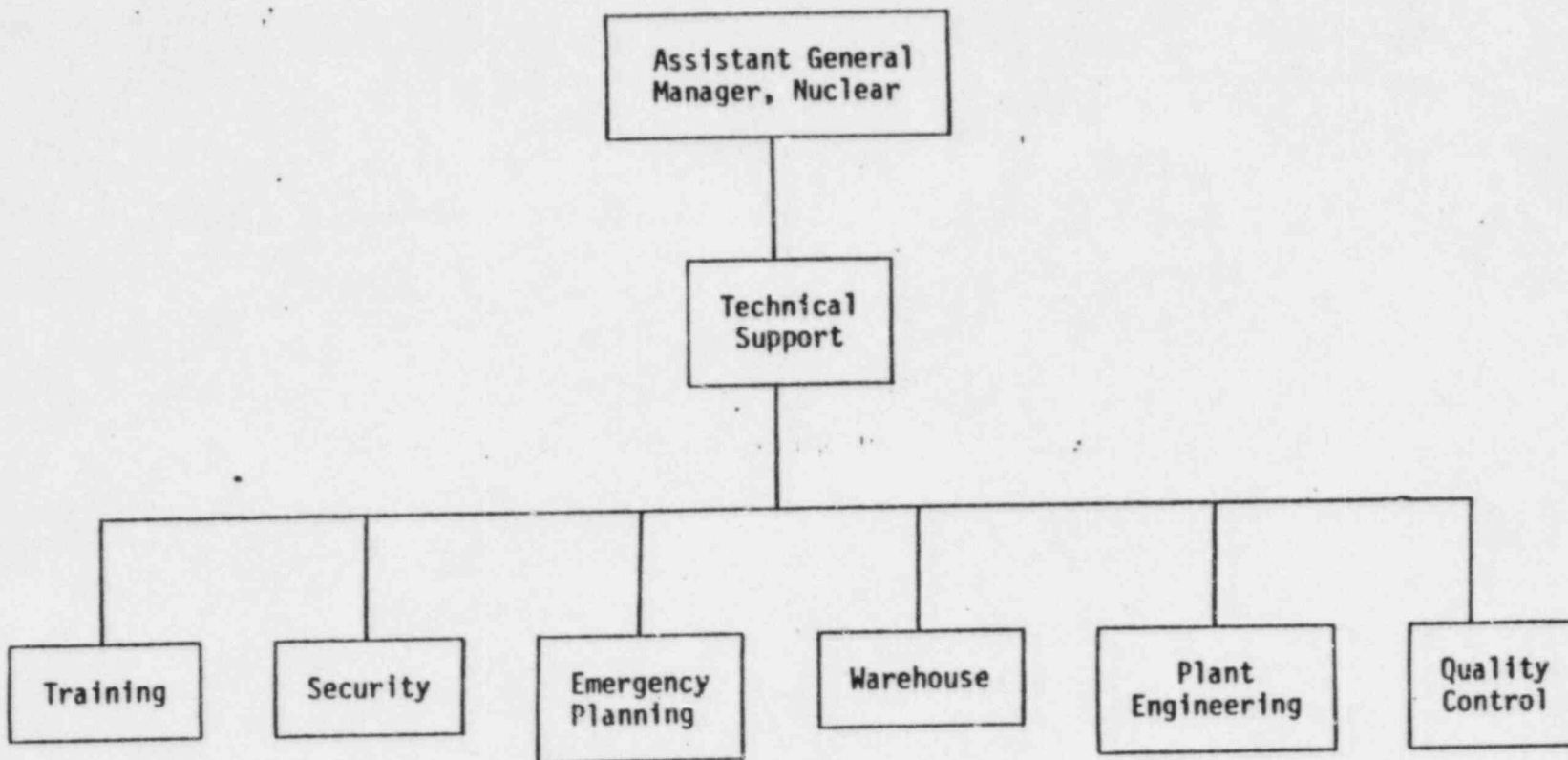


Chart 2-6 Technical Support Department

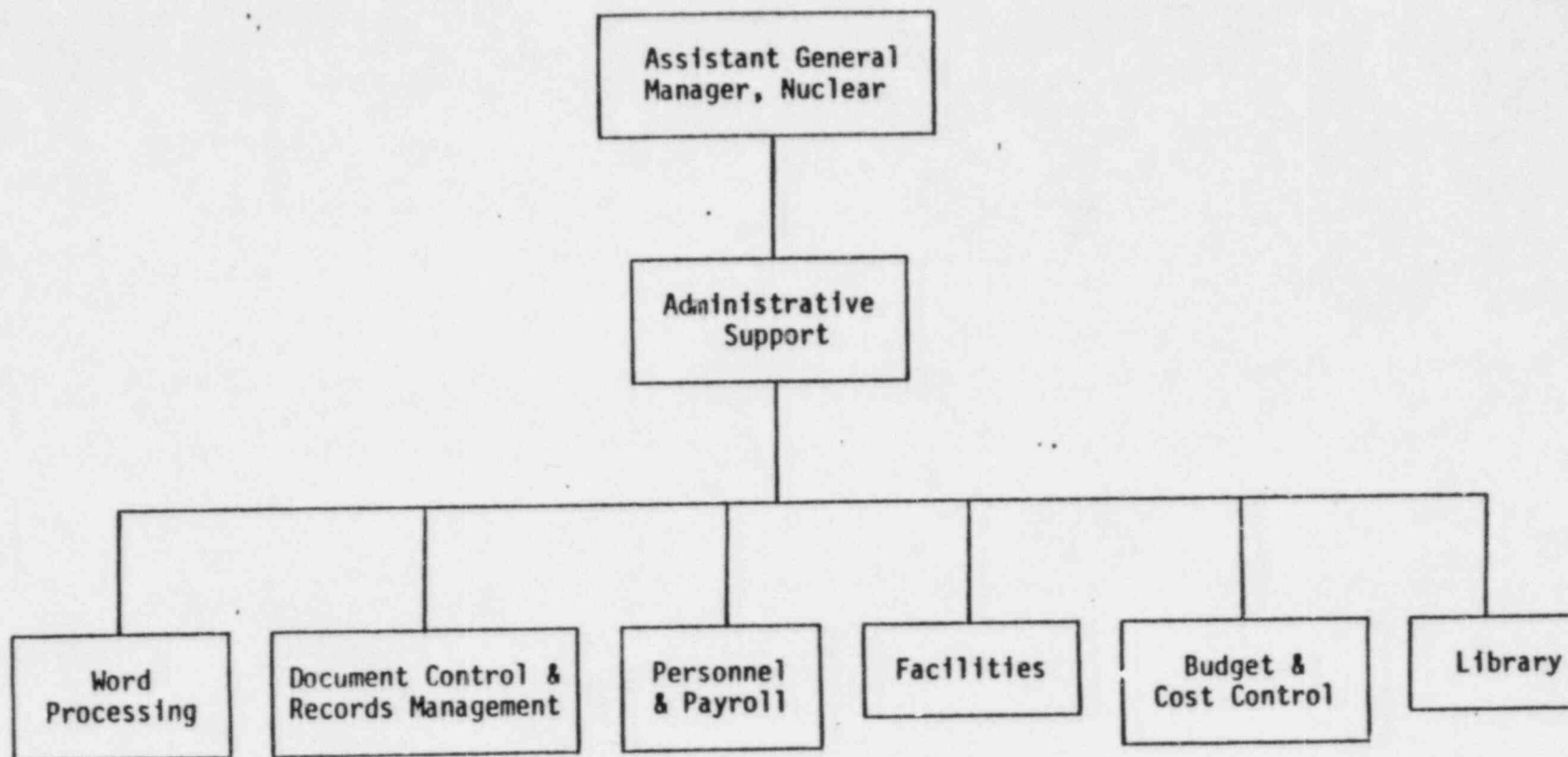


Chart 2-7 Administrative Support Department

3.0 ENGINEERING

There are three separate and distinct engineering functions that support Rancho Seco. These are: the Nuclear Engineering Department (NED) that reports to the Executive Director, Nuclear; the Engineering and Quality Control group (E&QC) that reports to the Nuclear Operations Department (NOD) Manager; and the Maintenance Engineering groups that report to the Plant Superintendent through their respective electrical-I&C and mechanical supervisors.

In broad terms, the NED engineering group handles the larger, more complex engineering tasks and bears the prime responsibility for the configuration management of the Rancho Seco plant. The E&QC group provides operational engineering support to the plant in the context of reactor engineering support for fuel loading and in-core physics considerations, administers the Technical Specifications related surveillance test procedures, is the administrative home for the Shift Technical Advisors (STAs) and is charged with monitoring the performance of the plant and systems from an engineering point of view. The maintenance engineering function performs short term engineering tasks aimed primarily at keeping the plant in an operational state although the line is not always clear where maintenance engineering stops and NED engineering takes over.

The inter-relationships of the engineering groups among themselves and with other groups they support is best described as poor. This appears to be due mainly to the complexity of the organization and the lack of organizational procedures that define how the groups are to operate. Also, there appear to be some marked personality differences among key personnel in the groups.

The new E&QC program of rotating the new engineers through several organizations including QA on a six month basis over a two year period is an innovative idea that will have positive results over the long term, if the organization can afford to be without those personnel for that period of time.

3.1 Nuclear Engineering Department

NED was separated from the SMUD central generation engineering group in mid-1984. All engineering activities that related to Rancho Seco moved into the new department with the exception of the drawing control program administered by the Engineering Configuration Control Center (ECC), which has been stated will transfer in the near future. NED is composed of an engineering design group that contains the classical engineering disciplines, a construction group, a nuclear fuel management/health physics group and a yet to be staffed cost engineering group. Only activities relating to the design process are discussed in this section. As of June 30, 1984 the department was composed of 80 full-time and 7 part-time employees with authorized vacancies of 32 and 5 respectively, for a total complement goal of 124 engineering personnel. The department is augmented by some 300 equivalent full-time contractor/consultant engineers with Bechtel Power Corp. providing approximately 250 personnel and others being supplied by B&W, IMPELL, Sierra Tech and Stone & Webster.

The NED design engineering group is located outside the secured area at the Rancho Seco site in a trailer complex known as "design city." As was the case with most utilities having operating nuclear plants on-line at the time of the TMI-2 accident in March of 1979, the involvement of the centralized engineering groups with the operating plant was minimal. When the avalanche of NRC-directed

post-TMI engineering analyses and modifications hit, most utilities were totally unprepared and they were forced to rely almost totally on the architect engineer and consultant firms for both the technical direction and accomplishment of the required work. SMUD was not unusual in this regard and is just now in the process of recovering from that avalanche, and is attempting to put together an engineering organization that can, at least, project manage the engineering work while accomplishing some work totally in-house.

Since the Nuclear Engineering Department was formed in the summer of 1984 there have been some steps taken to formalize and put the engineering/modification process under more manageable control. Key among these are the development of engineering department procedures, pursuit of the Integrated Living Schedule concept with the NRC and the formation of a cost engineering group.

Present plans are to have the engineering department procedures in three manuals:

- Manual A - Design Criteria, Standards and Specifications
- Manual B - Administrative and Design Control (this manual will incorporate existing design control procedures, ECP-1, 2 and 3)
- Manual C - Design Bases (the accumulation of historical plant design basis data and establishment of a design basis library)

The present schedule calls for Manual A preparation by mid-1985 and a skeleton of Manual B by the same time period. The generation of these design and administrative control documents is an excellent concept and, when completed, should eliminate two problem areas. The first is that all modifications to the Rancho Seco plant are not at present being accomplished using a consistent set of design standards. The second is that Manual B, which in part will discuss how the various engineering groups do business, should aid in eliminating confusion that exists in this area.

The formation of the Cost Engineering group makes good sense for an organization embarked upon a multi-year modification/improvement program at the proposed \$40 million level.

The proposed staffing level of NED appears appropriate when viewed against other engineering organizations of utilities with single nuclear units; however, with the exception of a small number of supervisors who were at Rancho Seco during startup, the plant-specific experience level of the group is low. Although it is the stated policy of the Manager, NED, that all engineers will receive plant-specific training, and future plans call for INPO accreditation in the engineer and technical manager area, very little specific training has been accomplished to date.

To a large degree, the glut of TMI modifications coupled with a rapidly expanding, inexperienced engineering group are the major factors in generating the ill will that is evident between the "design city" engineering group and the operations department personnel. As one senior member of NED put it, "When the avalanche of TMI mods hit, engineering was a small organization and did not have the personnel and procedures in place to effectively manage the multitude of contractors/consultants brought on-board. We sent out some bad designs."

Contributing also to this perception of poor engineering support by "design city" to operations are the large number of staff vacancies in NED. This is especially true in the electrical group and the lack of analog engineering expertise in the I&C group.

NED and the Station use a system of "pink" (for construction), "yellow" (as constructed) and "white" (as-built) drawings so that the current status of any drawing being used in the plant can be

readily determined visually. NED has embarked on a program to expedite incorporating the many yellow sheets onto the originals. At present there are 6529 yellows outstanding, of which 3090 require actual drawing revisions, and they are being incorporated at a rate of approximately 450/month. As of the end of 1983, the goal was to have only 400 DCN's outstanding at any one time. If this is still a goal, the current rate of 450 yellow sheets per month being incorporated is not adequate. The "critical" drawings are flagged and, when changes to them occur, they get first priority.

3.2 Engineering and Quality Control

The E&QC group is presently staffed with 22 engineers and 13 student engineer/student technicians, excluding the quality control function. These engineers cover nuclear, mechanical, electrical and STA functions as well as the surveillance test procedure area.

By recent direction, the group is to divorce itself from prime responsibility for any plant modification. The major mission of the group is to provide operational engineering support to operations. This is accomplished by administering the Technical Specifications related surveillance program, by conducting the in-service inspection program, by providing nuclear engineering support for plant startup and reactivity changes, and by initiating an expanded plant performance monitoring program. Individual members of the group are assigned as NODES (nuclear operations designated engineers) that follow for the operations department modifications that are being designed by the Nuclear Engineering Department.

The STA function, in addition to standing shifts, is responsible for review of all INPO significant operating events reports (SOERs) and other relevant nuclear industry reports, such as the B&W TAP reports on significant transients at other B&W plants. In addition to writing some Trip Reports for plant shutdowns, the group also

writes "near miss" reports to inform all operators of significant events in the plant that did not result in a plant trip. This appears to be an excellent use of the talent in the STA pool and could significantly contribute to a reduction of plant trips by analyzing and disseminating information on "near misses."

The major emphasis of the engineering arm of the E&QC group appears to be that of analyzing plant performance with a goal of maximizing plant capacity factor. If properly managed and not drawn into the everyday plant maintenance type problems, while concentrating on root causes and longer range solutions, this group could make a significant contribution. This, of course, will require that the maintenance engineering function be staffed adequately to handle the daily problems and, equally important, that the plant be properly instrumented to allow for meaningful diagnostic work to be accomplished.

3.3 Maintenance Engineering

The maintenance engineering function is split into two groups, electrical-I&C and mechanical. Both groups report through the maintenance superintendents to the plant superintendent.

The electrical-I&C group is composed of 8 engineers and 7 student engineers/technicians. The group's major function is to prepare calibration procedures and to perform engineering design and analysis as the need arises in support of the operations and the maintenance groups. Normally, the group will not perform engineering design modifications of Class I systems or major modifications; however, that ground rule is not clearly defined.

The mechanical group is composed of 5 engineers and 3 technicians. The group's major function is to review and coordinate work requests, prepare procedures and perform engineering analyses to support modifications.

Although the groups do a significant amount of engineering for design modifications, NED, having configuration management responsibility for the plant, must approve the design. This approval requirement causes some conflict in that the maintenance engineering group feels that the NED engineers do not know the plant and therefore question whether the outside group's approval of the design really provides any check and balance. This conflict is very apparent in the mechanical and I&C/electrical area and relates back to the perceived weakness in NED in these areas. LRS believes the design engineering function does not belong in maintenance engineering.

To further exacerbate this situation, the Senior I&C Engineer in the maintenance group resigned in June of 1984 and has not been replaced. In addition to providing direction to the I&C engineering group, the Senior I&C Engineer provided management direction to the instrumentation and controls technician groups. The Nuclear Electrical-I&C Superintendent is attempting to provide direction to the individuals in the I&C engineering group and manage the technician groups in addition to his normal duties. However, the superintendent level of management is almost totally occupied with Plant Safety Review Committee (PRC) meetings, daily scheduling meetings and a host of administrative duties. Consequently, there does exist a definite management vacuum in the I&C maintenance area.

The inability of SMUD to acquire experienced individuals in the I&C and electrical engineering area should be of serious concern.

3.4 Engineering Summary

Like most nuclear utilities in this post-TMI period, the engineering function at SMUD has been heavily overloaded with required engineering analyses and facility modifications. SMUD is now in the process of organizing its engineering function to allow for a more orderly engineering process to accomplish regulatory mandated modifications and internally generated plant improvements.

This revitalization of the engineering function is being somewhat hampered by the persistence of a "them" and "us" attitude between the nuclear engineering and operating departments. Even though the NED engineering group has moved to the Rancho Seco site, it is outside the fenced secured area and that tends to perpetuate the disharmony. It is not unusual to have a certain amount of discord in this interface, because operations always seems to want a quick fix, while engineering must pay attention to codes, standards and traceability. The SMUD situation is also hampered by the apparent inability of both NED engineering and NOD maintenance engineering to replace experienced personnel that have been lost in the electrical and I&C area.

Given that in the early days of the TMI modifications the engineering department was not staffed and not always on top of the situation, there seems to be a reluctance on the part of senior plant personnel to put that behind them and concentrate on improving the situation.

It is a plus that the NED engineering group is now at the site and is trying to take the reins and become more independent of the original Architect/Engineer contractor. This will allow SMUD to more effectively project manage the work and foster healthy competition for new work among an enlarged group of design firms. The E&QC charter to move more into the area of active plant performance engineering is also a positive move.

3.5 Recommendations

- E-1 NED engineering should expedite the generation of departmental procedures and these procedures should be reviewed and concurred in by the Nuclear Operations Department. The Executive Director, Nuclear should play a strong role in these nuclear engineering/nuclear operations discussions to assure timely resolution of issues and a clear understanding by the complete nuclear organization of how the engineering process at Rancho Seco is to function.

- E-2 Consideration should be given to rotating senior nuclear personnel between NOD and NED to both broaden their individual experience base and bring new perspectives to the engineering/operations interface.
- E-3 Plans should be developed to remove the design engineering function from the maintenance engineering organization as soon as NED can obtain or develop engineers with plant experience.
- E-4 The efforts in training in the engineers and technical managers area should be expedited, especially in providing training on Rancho Seco plant systems.
- E-5 Key personnel vacancies should be filled promptly, especially the lead I&C engineer in maintenance, those in the NED electrical and I&C area and those in the cost control group.
- E-6 Since it could take many months to eliminate the existing backlog of "yellow" drawings, it is recommended that progress in this area be carefully monitored to assure that a timely schedule is maintained.

4.0 LICENSING

The licensing function for Rancho Seco is split between the Nuclear Engineering Department (NED Licensing) and Nuclear Operations Regulatory Compliance group (NORC). This split dictates that the problem resolution level on licensing issues is at the Executive Director, Nuclear level. Also, coordination of licensing issues is further made difficult by the fact that the licensing function within NED is itself split between the Plaza 50 annex and "design city" at the Rancho Seco site.

The NED licensing group has primary responsibility for emergency preparedness planning, licensing support for the engineering design process, and a technical secretariat function that makes assignments on licensing issue follow up and coordinates the Coordinated Commitment Log (CCL). Future plans are to strengthen the analytical capability of the group in order to interact with regulatory and industry groups on proposed studies and other analytical issues. The group is composed of a supervisor and four engineers with five approved vacancies.

The NORC group is the main interface with I&E and Region V on inspection and enforcement items. These include inspection report responses, research and writing of LERs, I&E Bulletin responses and dissemination, etc. In addition, the group has the primary responsibility for interfacing with the NRR group of the NRC on Technical Specification changes and providing safety impact analyses to the NRC for Sholly amendment purposes. The group also provides a Chairman and Secretary for the PRC and membership on the MSRC.

The group is composed of a supervisor, two nuclear engineers, an engineering aide with an approved vacancy for a nuclear engineering technician. The latter position is currently filled by a contractor technician.

Overall, the effectiveness of the NED licensing function has been judged by the NRC to be weak. The most recent SALP report downgraded the group to the lowest category rating of III and based that poor rating on alleged unresponsiveness and poor technical quality of submittals to the NRC. These negative findings were attributed by the reviewers to be mainly due to the fact that SMUD had a small technical staff in licensing and was forced to rely heavily on contractors for these technical efforts. It is also clear that an attitude problem exists in the licensing area.

SMUD is attempting to upgrade the technical capability in the NED licensing area and offers have been made to experienced licensing engineers from cancelled Near Term Operating License (NTOL) nuclear plants. Also, SMUD is attempting to improve the timeliness of submittals by tracking commitments utilizing the Commitment Control Log mechanism. However, LRS feels that inadequate management emphasis has been applied in both of these areas.

For an organization to perform effectively in a heavily regulated environment, the licensing function should be staffed and chartered to operate in a mode that is at least abreast, if not ahead, of current regulatory issues. The term pro-active is used to describe this capability and simply means that the utility is out in front of the issues and does not simply react as new regulations are promulgated. A pro-active licensing group will interact strongly with the design engineering and analysis function to develop possible design solutions. These design solutions will form the basis for a licensing strategy that will be developed with management to define the best course for SMUD to pursue in accommodating new regulatory requirements.

Unfortunately, at the present time SMUD is very weak in the licensing engineering and analysis area. The two engineers in the NED licensing group have approximately 3 years of experience each. The two engineers are devoted to mainly technical secretariat functions. One administers the CCL and it appears the other's primary duty is to produce the

bi-weekly "Rancho Seco Modification Tracking and Status Report/Licensing Change Status Report."

The only evidence of what would be considered pro-active licensing activity was being provided by a contract licensing engineer, who was interacting strongly with engineering in developing SMUD's Appendix R program.

With regard to the NORC group, both the SALP and PAS teams commented that the group appeared to be overloaded. LRS concurs with that observation.

As noted earlier, the group is heavily involved in upgrading and maintaining the Technical Specifications and, at the time of this evaluation, there were some 15 major Tech Spec changes that had to be written, processed through the safety review committees and iterated with NRR for final approval prior to startup from the next outage in early 1985.

In addition to the Tech Spec changes and the concomitant Sholly amendment submittals, two of the engineers in the group are heavily engaged in PRC and MSRC review committee work. The supervising engineer is both the chairman of the PRC and a member of the MSRC, while the second engineer is the secretary of the PRC. The chairmanship and secretarial functions of the PRC both take an inordinate amount of the individual's time, estimated roughly between 60 and 80 per cent. This, of course, leaves very little time to conduct the normal business of the Regulatory Compliance office. As a consequence, although the majority of the regulatory compliance work is completed on time, the quality of the work has been judged by the group itself, and by its peers, to be deteriorating.

As noted in the training section, there is no formal program for training of technical staff. As an example, the junior engineer in the compliance section has been with SMUD for 7 months and bears the primary responsibility for drafting the Tech Spec changes. In that 7 months time period he was given 8 hours of familiarization training on Tech Specs and attended a systems training course on Rancho Seco. Because of the group's work load, he was thrown into a "sink-or-swim" environment with the back log of Tech Spec work. Much to his own credit and hard work he is now an effective contributor to the group.

With regard to the split licensing organizational issue, there does exist a high probability that important issues could slip through without receiving the appropriate review. A case in point, in September, 1981 the District made a commitment to the NRC to isolate an auxiliary steam line that penetrated the HPI "A" pump room. Apparently, operations personnel were never advised of this commitment and consequently did not revise their operating procedures accordingly. This error was detected and an LER was issued in February of 1983 and the corrective action stated was to rely upon a new computerized commitment tracking system to ensure proper followup of commitments.

Apparently, there are still coordination problems in the licensing area despite the use of the CCL. While most interviewees agreed that the CCL was a needed document, it was described as cumbersome to use and had no built-in method to assure that all parties to a commitment, not just the assignee of primary responsibility, were identified and their contributions tracked. To further guard against coordination problems, two new inter-departmental procedures have been drafted. IDP-002, "INCOMING REGULATORY CORRESPONDENCE", and IDP-003 "OUTGOING REGULATORY CORRESPONDENCE". The stated purpose of the procedures is to increase the coordination between the NED licensing group and the NORC with all incoming regulatory correspondence passing through licensing for assignment, thereby assuring no regulatory requests "fall through the crack."

4.1 Recommendations

- L-1 SMUD should move aggressively to fill the vacancies in the licensing group with experienced licensing engineers with major emphasis on talent that could immediately support the engineering design/licensing effort.
- L-2 SMUD should consider consolidating the licensing function under one manager (OM-2).
- L-3 Whether licensing is consolidated or not, the NORC group, if it keeps its present work load, should be increased by at least one or two nuclear engineers with additional clerical help.
- L-4 In line with L-3 above, the practice of having an associate nuclear engineer solely responsible for the generation of the PRC minutes should be reviewed and the option of having dedicated clerical support, including upgraded word processing capability, should be considered.
- L-5 Increased management emphasis should be applied to commitment tracking and timely submittals to NRC.

5.0 OPERATIONS

The primary function of an operating department is to conduct plant operations in a safe, effective, efficient and economical manner, and in compliance with all regulatory requirements. In order for the department to accomplish its functions, it must be adequately staffed with highly skilled, trained, dedicated and motivated personnel. In addition, these personnel must be effectively and efficiently managed.

Since the nuclear industry still faces a shortage of such personnel and the high skill levels required are attained by extensive training and re-training, it is imperative that SMUD develop and maintain training programs at all levels to insure that Rancho Seco has sufficient trained personnel in all positions to accomplish the goals and carry out the responsibilities of the department.

In addition to these personnel, the success of the operational organization is heavily dependent on good operating procedures, controlled drawings representative of the actual plant conditions in the control room, an effective and safe work order and clearance control system, a controlled means of obtaining information required by the operators and a well organized, condensed, coordinated manner of obtaining industry related information. LRS outlines its operational concerns as follow:

- o Individuals appear to get trained to pass and maintain NRC licenses and little, if any, management or supervisory skills are taught to individuals who are promoted to supervisory positions in operations.
- o Rancho Seco in 1981 organized to the six shift concept. Following the next refueling outage the plant returned to four shifts because of a heavy loss of licensed personnel from Rancho Seco. The plant has since returned to five shifts and

plans to go to six shifts as soon as an adequate number of trained and licensed personnel are available. It is apparent that substantial overtime has been required by operations to support the plant during this period. Care must be exercised to insure "burn out" of key personnel does not occur.

- o LRS has reviewed in detail approximately 50 of the current plant operating procedures. Since most of the procedures were written during plant startup ten years ago, they do not meet present day criteria. In addition, many new and/or supplemental procedures need to be written. Currently, a limited number of procedures such as the Clearance procedure and the Abnormal Tag procedure have undergone or are undergoing revision.
- o The system for controlling drawings at Rancho Seco appears to be adequate. However, the system is not being maintained. A detailed review of several of the control room drawing "sticks" showed that they contain many pink and yellow drawings. In some cases, the yellow drawings date back to 1978. A major effort is necessary to audit and redraft the drawings to insure that the controlled drawings are totally updated and accurate. In addition, the use of uncontrolled drawings on the control room wall and in the water treatment "shack" must be terminated immediately. These drawings are utilized by personnel to perform critical functions such as develop work orders, align systems, establish system clearances and train personnel.
- o A review of the control room log books (shift supervisor, control room, abnormal tag and temporary procedure) was completed. Both the control room and shift supervisor logs appear precise, neat and professional. The abnormal tag log was complete; however, some abnormal tags since 1979 are still outstanding. The temporary procedure program is a sound program and is being effectively implemented.

- o The control and maintenance of the control room procedures is the responsibility of the operations department. There has only been one internal operations and no external operations audits of the procedure manuals.
- o There does not appear to be a managerial structure of individual accountability for plant personnel, especially operations personnel. Over the years of plant operations and more importantly during the past few months several operational errors, such as the damage to a circulating water pump in September and to the canal pumps in October, occurred without a detailed independent plant management investigation and follow-up corrective action.
- o The regulatory requirement for the establishment of a Shift Technical Advisor (STA) has been satisfied. However, an integrated working relationship with the operators has not been developed. A new Abnormal Tag procedure has been developed that clearly defines the criteria for the use of abnormal tags. It also requires the sign-off of a maintenance engineer prior to tag implementation. The sign-off is not the STA and when questioned as to why not, no clear reasons could be obtained. LRS believes the STA, not the maintenance engineer, is the most qualified and trained engineer to review the abnormal tags.
- o The Maintenance Information Management System (MIMS) is a well defined and implemented program for the coordination, review, tracking, monitoring and close out of work requests. However, there appears to be an excessive backlog in the close out of work requests.

The Outage Coordinator does the planning and scheduling of the work requests during outages but not during normal operations. It appears that during normal operation the interdepartmental planning and scheduling results in wasted time and resources.

- o The experience level of the operating personnel was reviewed. The experience level of the shift supervisors, senior control room operators and the auxiliary operators was quite good. Some of the control room operators and most of the equipment attendants have little nuclear or plant experience. Several licensed control room operators have less than three years of nuclear experience.
- o A control room shift change was witnessed. The change appeared to be orderly, professional and in accordance with good practice.
- o Since the control room and adjoining shift supervisor's office are extremely cramped for space, the plans to utilize the larger room adjacent to the control room for additional operational space will be a most welcome addition.

5.1 Recommendations

- OP-1 Develop and implement a mandatory management/supervisory training program for all personnel promoted or hired into operations supervisory positions.
- OP-2 Develop and implement an expedited program to return to six operational shifts to control the use of overtime and to improve requalification training opportunities.
- OP-3 Develop and implement an extensive and detailed procedure review program to determine what operations procedures require revisions and what new procedures are required.
- OP-4 Develop a list of critical drawings required for operation, expedite the revision of these drawings and eliminate the use of uncontrolled drawings when completing critical plant operations.

OP-5 Develop a methodology of conducting independent review of operational errors and establish a management system that assures delegation, authority, responsibility and accountability at the individual level in the plant.

OP-6 Consider expanding the use of the STA function into more plant activities, including Abnormal Tag engineer sign-off.

OP-7 Study the benefits of developing a totally integrated planning and scheduling organizational concept.

OP-8 The program to utilize the large room adjacent to the control room for additional space needs to be expedited.

OP-9 SMUD should induce the NRC licensed personnel that have left Rancho Seco and are currently in other positions within SMUD to return to operations or training at Rancho Seco.

6.0 MAINTENANCE

The efficient and safe operation of a nuclear power plant is dependent on the support of a highly skilled and trained, well managed, motivated and organized maintenance organization. An in-depth appraisal of the Rancho Seco maintenance organization was conducted and the results of the two groups (Mechanical and Electrical-I&C) are highlighted as follows:

Mechanical

- o Management of mechanical maintenance is perceived as being conducted in a technically adequate fashion but utilizing a style which is both autocratic and intimidating. No opportunity exists in this organization to provide feedback from personnel performing specific tasks. Also, it appears that a climate of lack of respect for subordinates may exist. This is particularly true of the attitude toward the building maintenance mechanics.
- o During non-outage conditions, mechanical maintenance planning and inter-departmental scheduling are poor. This results in many wasted hours waiting for tags, clearances, and other department support.
- o The present mechanical maintenance training program is inadequate. An apprenticeship training program does not exist. A program is under development, but was not available for review.
- o At department and safety meetings, individuals are instructed that it is mandatory to follow plant procedures; however, in at least one case, an individual was given a verbal order to violate procedure. The individual refused and requested the order in writing. The order was then given in writing and the individual completed the request.

- o The present plant Clearance (tagging) Procedure has been deemed as unacceptable and a task force has been established to develop a new procedure. The results of the task force are expected in early November 1984. The present practice by operations to sign the clearance, "The foreman is responsible to insure clearance boundaries prior to work", is not an acceptable practice and should be discontinued. The operators, not the maintenance foreman, have received system and system inter-relationship training and are clearly the individuals responsible for determining clearance boundaries and adequately installing tags. However, it is prudent for foremen and/or craftsmen to review tags and boundaries to the best of their ability.
- o The SMUD supporting departments in Sacramento such as Personnel are perceived by plant personnel as non-supportive to the plant and its needs. As an example, it was stated that in late 1983, the 1984 manpower budget was approved which included some welders for Rancho Seco. The first welder arrived in September 1984.
- o An integrated Rancho Seco program for the maintenance and control of vendor manuals and technical information does not appear to exist. In some cases, uncontrolled and perhaps out-of-date information is being utilized to maintain and/or repair plant equipment.

Electrical-I&C

- o A maintenance training program for I&C does not exist and time in grade is the dominant factor in promoting individuals to journeyman. The electrician training program appears to be good. A department apprenticeship program is under development, but was not available for review.

- o The Lead I&C Technician provides supervision and direction to the I&C Technician Supervisors. Since the position of Lead I&C Supervisor is vacant and the Electrical-I&C Superintendent is almost fully occupied with administrative and technical committee work, the technician groups receive little, if any, direction and supervision.
- o As is the case of mechanical maintenance, the non-outage coordination of work requests is done manually by the department. During outage conditions all work request planning and scheduling is done by the Outage Coordinator utilizing a computerized program.
- o The I&C technician groups appear to have an excellent working relationship with the operating department.
- o The average plant-specific experience level of the I&C group is in the respectable 3 to 5 year range, but appears to be dropping. The negative trend must be countered by developing and implementing an effective I&C training program. Such a program was said to be under development.
- o There is a problem with the implementation of preventive maintenance (PM) procedures; however, the delinquent backlog is decreasing. There were 140 delinquent PMs going into the last scheduled outage and this was reduced to 40 at the completion of the outage.
- o There appears to be an excessive backlog of Engineering Change Notice (ECN) related work requests in the I&C area.

6.1 Recommendations

MA-1 Steps should be taken to correct the management style currently utilized in mechanical maintenance.

MA-2 Consider the development and implementation of a total work management program utilizing a centralized planning and scheduling department for all plant conditions.

MA-3 Develop and implement as soon as possible a maintenance department personnel apprentice training program.

MA-4 Insure that all plant procedures are adhered to and, when exceptions are required, insure that appropriate procedural steps are taken prior to implementation.

MA-5 Expedite the preparation, review and issuance of the new Clearance Procedure.

MA-6 Establish a responsive working relationship between Rancho Seco and the SMUD supporting departments.

MA-7 Expedite the development and implementation of an integrated Rancho Seco program for the maintenance and control of vendor manuals and technical information. This program should be coordinated and controlled by the site document control organization, not maintenance.

MA-8 Expedite the filling of the vacant Lead I&C Technician position.

MA-9 Develop a corrective action plan to eliminate the backlog in the preventive maintenance program.

7.0 QUALITY ASSURANCE

An effective Quality Assurance program, which includes an effective Quality Assurance organization, is not only a Federal requirement of 10CFR50 Appendix B, it is also a structured management approach that can and should be very beneficial to any nuclear utility company. Currently, the SMUD QA program, as described in the Rancho Seco Quality Assurance Program Manual and the implementing procedures such as the Quality Control Instruction Manual, minimally addresses all of the eighteen criteria. Also, the QA Department and SMUD management are having difficulty in adjusting to the new role of the QA Department as a line organization, instead of the pure staff function it had performed until nine months ago. There are several experienced and qualified personnel in the QA organization around which an excellent organization can be built.

Some specific observations related to Quality Assurance which include the nonconformance/corrective action and codes and standards activities are:

- o In general, the QA organization is not structured as an organization with supervisors and leads along functional lines. It is more a collection of individuals, much like a staff organization.
- o The formal educational level within the QA Department is very high. However, the actual commercial nuclear operations experience is low and in need of strengthening.
- o The QA Department practice of being reasonable may be admirable, but in some instances the rules should either be enforced or the rules changed. For example, it is QA Department practice within the construction activities, if a nonconforming condition is found, to allow three or four days to correct the problem. If the condition is not corrected in that time period, then an

NCR is written. Also, the Technical Specifications require an audit of all Technical Specifications annually. However, every eighteen months is the actual schedule QA is working to, which is perceived by QA to be satisfactory.

- o Follow-ups of QA Surveillance Report open items are not being conducted in the time frame required. It does not appear that an adequate tracking system exists to assure these follow-ups are conducted in a timely manner.
- o SMUD management, both in Sacramento and at Rancho Seco, uses the QA Department as staff to perform a variety of tasks. This may show management confidence in the QA people, but as a result, the department spends a significant amount of its time on functions other than quality assurance. This in turn contributes to the QA Manager routinely by-passing all supervision in his department and giving individuals specific work assignments which tends to further undermine the structure of the organization.
- o The salary structure of the QA Department personnel is generally one grade lower than comparable positions in the Engineering Department. This could cause turnover problems in the future and does presently cause recruiting problems.
- o The site QA group was directed by the QA Manager to stop doing audits and only do surveillances early this year in order to respond to an NRC item that indicated that QA was not involved enough with the actual work. The surveillances are not done in accordance with a pre-planned schedule and for the last eight months the total hours per day devoted to this activity have averaged approximately three hours for the total group. Surveillances of operations activities (RO-SRO activities) are not being performed by QA.

- o The QA Department is not routinely involved in Class 2 items or fire protection items, or in-service requests which could be used to repair or service Class 1 items.
- o The District and Department goals and objectives are not known by the QA Department personnel at the site.
- o Table 7-1 indicates those areas of Appendix B that lack complete or partial policy and procedure coverage.
- o The site QA group does not have a file of the codes, standards and Regulatory Guides, etc. that apply to their routine duties.
- o A comprehensive program for training affected SMUD personnel in the QA Program Manual and the QCI Manual and subsequent revisions do not exist. Training in the QA Department consists primarily of on-the-job training.
- o Serialized work requests have not been reviewed by QA for four to six months and QA does not routinely review other Class 1 work requests.
- o The QA program does not address packaging and shipping of low level radioactive wastes.
- o Background checks are not being routinely performed by SMUD for their auditors and inspectors.
- o Operations QC is performing engineering surveillances in addition to their QC functions. This dilutes their primary inspection function.
- o NCRs are not being processed by site QA in a timely manner.

- o The QA Department does not reference one-third of their QA procedures in their audit schedule and they only reference approximately fifteen of the Station's administrative procedures. Items such as Mod Test Program, Work Requests, Procedures, Records Management, Turnover and Release of ECN Packages, Radwaste Control, Fire Protection Program, etc. are not referenced.
- o All of the Construction QC inspectors are contractor personnel.
- o The QCI's are generally out of date (some instructions by several years). A committee was formed about two years ago to rectify this, but it does not meet very often and has not been very effective.
- o QCI #7 requires a Corrective Action Coordinator within QA. This has never been a functioning position and audits of this area have not addressed this fact.
- o QA Department audits are primarily audits of paper and there does not appear to be a close relationship between the surveillance program and the audit program, which is primarily due to the functions being performed by two different groups.

7.1 Recommendations

QA-1 Revise the QA organizational structure along more traditional lines and identify supervisory and lead positions (refer to Recommendation QM-2).

QA-2 Revise the written QA Program Manual along more traditional lines, such as eighteen sections in order to more closely track and identify with the NRC requirements.

QA-3 Update and supplement the Quality Control Instruction Manual to adequately and accurately provide implementing procedures for the QA Program. Consideration might be given to changing the name to Quality Procedure Manual and include the four or five QAIPs that exist. Consideration should also be given to removing the NDE and welding procedures and putting them under a separate special processes procedure manual.

QA-4 Revise the QA program to assure QA and QC department involvement in all QA Class 1, commercial grade to be used on Class 1 systems and selected Class 2 activities. This would include, as a minimum, QA Department review and approval/concurrence of the Class 1 (and commercial grade) purchase requisitions and work requests and changes to both prior to their release.

QA-5 Establish a comprehensive QA training program for all nuclear personnel who have responsibilities in the QA program.

QA-6 Provide for QA and QC involvement in packaging and shipping of radioactive materials (low and high level).

QA-7 Establish a program of verifying education and experience records of all audit and inspection personnel (both SMUD and contractors) prior to their use on safety-related activities.

QA-8 Re-evaluate the audit and surveillance program to assure it covers all of the important safety-related procedures and work activities.

QA-9 Establish a system to assure timely follow-up of open QA Surveillance Report items.

QA MATRIX

<u>Appendix B Criteria</u>	<u>QA Program Section</u>	<u>QCI Section</u>
I Organization	1	-
II QA Program	-	-
III Design Control	2, 3 and 7	5 and 11
IV Procurement Document Control	4	4 and 10
V Instructions Procedures and Drawings	7, 20, 24 and 25	-
VI Document Control	18 (partially)	9 (partially)
VII Control of Purchased Material, Equipment and Services	5, 10 and 11	6
VIII Identification and Control of Materials, Parts and Components	8	-
IX Control of Special Processes	9	101, 102, 104, 105, 106, 109, 110, 111, 112, 113 and 114.
X Inspection	6, 12, 13, 16, 21 and 29	107 and 108
XI Test Control	26	-
XII Control of measuring and Test Equipment	14 (partially)	-
XIII Handling, Storage and Shipping	15	-
XIV Inspection, Test and Operating Status	16 (partially)	-
XV Nonconforming Materials, Parts and Components	17	1 and 3
XVI Corrective Action	27	7 and 13
XVII QA Records	18 (partially)	9 (partially)
XVIII Audits	19	2 and 8

Table 7-1

8.0 TRAINING

A well developed and effectively managed training organization is instrumental in the support of an efficient, safe, reliable nuclear power plant. An in-depth appraisal of the Rancho Seco Training Department shows that the training has primarily focused on the licensed operator training and the requalification training. The success of this program has been reasonably good; especially the June 1984 NRC license examination which was 100% successful.

However, the success of this program has been in part the result of a large dependency on contractors. Fourteen of the sixteen contractors in this program at Rancho Seco have been on site for extended periods, some for as long as 5 years. These contractors have become extremely knowledgeable about Rancho Seco and its systems. In this program only the group supervisor is a SMUD employee. This dependency is extremely expensive. Although continuity of instructors, which is vital to a good training program, has been good, SMUD employees would add strength to the training organization. To establish SMUD trainers, it is important to remember that trainers have to be certified to serve as licensed operator instructors, which requires being qualified on the Rancho Seco plant. This qualification would require approximately one full year of work.

The requalification program required by regulatory requirements also appears to be well done, but it too is being implemented by contractors. Since the plant is operating on a five shift basis, the time allowed for the operators to spend in requalification training is limited due both to shift rotation and overtime requirements.

Additional observations are as follows:

- o The supervision of the training organization has a great deal of operating plant experience. This has been valuable from a license point of view but the complexities of managing a

complete training facility, as is required at a nuclear plant, requires leadership with broader training program views.

- o The program for review of SOER, industry information, etc. was reviewed as part of the licensed operator requalification program. The program appeared satisfactory, but the limited time for training has impaired the program.
- o The Nuclear Training Superintendent has tried unsuccessfully to hire permanent SMUD trainers. Not only are qualified personnel hard to find, the SMUD hiring practices have not been supportive. It is important to understand that the reliance on contractors will continue until the recruiting and hiring roadblocks can be removed.
- o The Training Department is not involved with Quality Assurance, Fire Protection and Emergency Plan training except for personnel and facility scheduling.
- o All of the training records are maintained on a manual system. The current security/ALARA computer system which was originally scheduled for early 1981 has just recently been put into operation. This system was to include maintenance of training records; however, during the demonstration test it was determined the training functions of the system cannot be utilized.
- o The non-license training program is supervised by a contractor and the program is under development.
- o The maintenance training section is staffed with SMUD personnel and is currently developing an apprenticeship program with the affected departments.

- o SMUD has committed to INPO accreditation of its training activities and has concentrated on licensed, requalification and non-licensed operator training. A second pre-accreditation INPO visit this fall appeared to indicate that INPD accreditation in these three areas may be achieved in mid-1985. Such accreditation would appear to be dependent on retaining the present complement of contractor trainers for the three areas since there would be no way to qualify SMUD trainers within 8 months.

Accreditation in the other seven areas is scheduled by the end of 1986. Given the present status of this training, it seems unlikely that this goal can be met for all seven areas. Reliance on contractors for this accreditation will be both very expensive and time-consuming. In addition, it fails to develop SMUD competence in the vital training area. Experience with other utilities shows that these accreditation tasks can be accomplished without such excessive reliance on contractors.

- o In the electrical-I&C area there are four training areas -- electricians, electrical technicians, I&C and computer specialists. Instructors have been assigned for the first two groups and one instructor has been designated for the I&C group.

Program plans for electricians and electrical technicians have been prepared by the Training Superintendent and concurred in by the Electrical-I&C Supervisor.

- o In the electrical maintenance area, a good deal of training has taken place. Of the 30 courses planned for 1984, some 14 were given, 6 cancelled, 6 rescheduled and 4 set for October/November. Courses such as prints and references, valve actuator maintenance, AK-25 breaker maintenance and DeLaval diesel I&C systems have been well received although workshop facilities are lacking to make the training fully effective.

- o Two instructors in the chemistry-radiation area are developing lesson plans. One has a master's degree in communications and has good plant experience. Both state that training is well received by chemistry-radiation technicians. Their assignment, especially scheduling, will be simplified by splitting the chemistry and radiation protection organization into two entities so that a technician does not require training in both disciplines. These instructors face a challenge, common to other instructors, of developing new courses while devoting time to implementing the on-going courses. Some 10 to 20 man-hours of development may be required for a one hour course.

8.1 Recommendations

- TR-1 A program for the replacement of training contractors must be developed and implemented as soon as possible.
- TR-2 As additional licensed operating personnel become available, licensed SMUD operators should be made available as trainers.
- TR-3 The current training facilities are inadequate. A separate training building capable of housing all of the training department's needs and the simulator should be designed and built expeditiously.
- TR-4 The procurement of the simulator currently under study should be expedited.
- TR-5 Replace the lead position in the INPO accreditation program with a SMUD employee. In addition, key personnel should visit other B&W facilities to gain experience on the job and task analysis.
- TR-6 Conduct a management review of the INPO training program accreditation plans and processes to assure that the technician resources available for training are consistent with the commitments.

TR-7 Assign a SMUD employee to lead the contractor effort of developing lesson plans and system manuals.

TR-8 The delivery of a computerized system for the training department records should be expedited.

9.0 PLANNING, SCHEDULING AND OUTAGE MANAGEMENT

The planning and scheduling is accomplished at Rancho Seco in the Outage Supervisor's group that reports to the Nuclear Operations Department Manager. The group is headed by an Outage Supervisor, who at the present time is a B&W contract engineer but had previously served with SMUD as the STA supervisor; an Outage Coordinator, who is an ex-shift supervisor-SRO licensed and extremely knowledgeable about the plant, its systems and their operations; two maintenance planners that are both contractor employees and three clerks. Plans are to fill all these positions with SMUD employees in 1985. During outages, the group is supplemented by the addition of shift managers, drawn from the operations department, who report to the Outage Supervisor. The shift managers provide outage management coverage for all shifts.

Outage planning is accomplished using the computerized Project/2 system. In addition to the normal refueling outage planning, the group has developed "cook book" Project/2 schedules for mini-outages caused by plant problems such as steam generator tube leaks, control rod drive stator failure and high pressure and low pressure turbine failures.

During outages the Outage Coordinator is in tactical control of the plant. This key individual holds a daily morning meeting at the start of the day shift with maintenance, operations, construction and E&QC personnel. The meeting is to update the work that was accomplished on the back shift and to plan the work for the day. All work in the Rancho Seco plant is handled by a formal work request (WR) and WRs that are critical to the outage schedule are prioritized daily, employing computer printout sheets.

The Outage Coordinator also holds a similar scheduling meeting at the end of the day shift and start of the second shift to update the work completed and plan for the second shift.

Following the Outage Coordinator's meeting at 0730, the Outage Supervisor holds a meeting at 0815 with plant management and engineering personnel. The Outage Coordinator updates the group on plant status and the meeting concerns itself mainly with problem resolution and work-around programs. This latter meeting is the primary interface meeting between operations and engineering on outage matters.

The organizational concept of shifting plant management from the Plant Superintendent to the Outage Supervisor during all plant outages is quite common in the industry. What apparently makes it work so well at Rancho Seco is that during normal operation the Outage Coordinator plays an important role in the daily planning of key maintenance activities. After coordinating with the operations department during the morning shift turnover, where critical work requests are prioritized, the Outage Coordinator conducts a morning planning meeting with maintenance personnel to assign prioritized work requests. The Outage Coordinator's close involvement on a daily basis during normal operations keeps the outage group informed on plant conditions and allows for a smooth transition with no time lost getting up to speed when an outage occurs.

During an outage the actual plant modification work is accomplished by either the NED construction group or the operations department maintenance personnel. The split is generally made along the lines of size and nature of the job. The larger construction type activities that have few interfaces with existing plant systems would be accomplished by the construction group. The more complex and plant-system interrelated ECN's would be the responsibility of the maintenance group whose system was being modified.

The NED construction group is composed of 8 engineers, including the Resident Engineer, and one approved vacancy. There are also 7 clerical and drafting support personnel.

To accomplish the ECN installation work, the group relies on craft support from the craft site support contractor, presently NPS. The NPS contract is administered by the Manager, Nuclear Operations and both maintenance and construction call upon that contractor for craft support.

During refueling outages craft support is approximately 200 personnel. For normal operations the steady state craft support level is approximately 100-120 with roughly an 80/20 split between construction and operations, respectively.

When a system has been modified, either by construction or maintenance, there is a formal turnover and acceptance procedure prior to that system being placed in operation. The interface group that accomplishes this is the Startup Group. The group is organizationally located in the electrical-I&C maintenance group.

This formal turnover is governed by Administrative Procedure AP 44. The process embraces the typical joint walkdown of the system, a turnover punchlist, a formal method for controlling testing or tie-in to an existing plant system and a formal method by which operations accepts the modified system. AP 44 has just been completely rewritten to more clearly define the interfaces and responsibilities of the various groups and, if followed, should assure that the important elements of systems completion, turnover, acceptance testing and acceptance for operation are covered.

During the interviews there was some concern expressed about the construction group being organizationally separated from the plant operating organization. Supposedly the concern grew from the fact that the bulk of the construction work had potential for interacting with plant operations. In the Organization and Management section of this report, an organizational change of relocating the construction activities from engineering to planning, scheduling and outage management has

been recommended. Since the major interaction of construction is with operations, involves operating systems and obtains the required construction crafts from the maintenance contractor controlled by maintenance, the organizational inter-relationships will be strengthened with this move.

On the negative side of outage activities, a number of persons interviewed indicated that the whole organization seemed to lack the necessary esprit de corps and drive to jump on critical path items and work them around the clock to get the plant back on-line as soon as possible. This comment came more frequently from those who had previous nuclear utility experience.

Some typical comments were, "an apparent lack of accountability in individuals who were poor performers," "poor cooperation between the various maintenance groups," "the absence of top-to-bottom management emphasis on improving plant performance" and that "SMUD is reimbursed by PG&E whether the plant runs or not."

9.1 Recommendations

PS&OM-1 Consistent with the recommendation in the Organization and Management section of this report, the Goals and Objectives adopted by the Board and as translated into management objectives by SMUD management have to be made clear and concise and passed down through all levels of the organization. This is especially true with regard to cost/benefit considerations of keeping the Rancho Seco plant up and operating and the actions necessary to return the plant to operation after a shutdown.

PS&OM-2 Consistent with recommendation OM-2, relocate the construction functions into the Planning, Scheduling and Outage Management organization.

PS&OM-3 The Outage Coordinator's total control of all work requests during outage activities has proven to be most beneficial. Movement to a centralized total planning and scheduling organization for all work activities during all plant conditions should be considered.

10.0 CHEMISTRY AND RADIATION PROTECTION

The present organization has a single superintendent in charge of both chemistry and radiation protection and the supporting technical staff, with the exception of a staff health physicist and chemist, works on rotation to perform both chemical analyses and radiation protection activities. During outages, the most critical period for radiation protection, there is great reliance on contractors, both as supervisors and as technicians.

Given the increasing demands and more rigid technical requirements, industry practice is to split chemical and health physics operations into separate functions. This permits specialization and a higher degree of expertise to be developed. Extensive interviews with the C&RP staff and technicians led to the conclusions that:

- o The current technician training program is inadequate. In addition, the skill levels of the technicians do not satisfy the criteria established for the position.
- o The organizational structure is too heavily dependent on contractors to perform normal operational duties.
- o The Rancho Seco chemistry and radiation protection organization is typical of industry organizations ten years ago. The technical skill required of these positions today has increased substantially and no longer lends itself to a combined group.

10.1 Collective Radiation Exposure

The collective exposure of the Rancho Seco work force is measured in person-rem, i.e., the number of persons multiplied by their average radiation exposure. Fig. 10-1 illustrates how the Rancho

Seco collective exposure has varied from 1975 through 1984. The dotted line in the illustration represents the average exposure per PWR unit. It will be seen that on average Rancho Seco has been operated at a level of exposure well below the average for PWR units. This is illustrated in Fig. 10-2 where the average annual person-rem for all PWR units, reckoned from the date of commercial operation through Jan. 1, 1984, has been plotted. Rancho Seco's average of 343 person-rem compares favorably with 493 person-rem for all PWRs. Among the B&W units, Rancho Seco ranks second. This represents commendable control of worker exposure.

The upward trend of collective exposure starting in 1979 reflects outage requirements, some of which involve NRC required backfits and plant modifications stemming from TMI. The peak value of 689 person-rem in 1983 reflects steam generator repairs where radiation levels of 20 rem per hour are encountered.

10.2 Individual Worker Exposure

SMUD employees and contractors who enter radiation controlled areas (RCA's) are ordinarily limited to 0.3 rem per week and no more than 5 rem per year. Throughout its commercial operation no worker at Rancho Seco has received more than 5 rem in any year. In 1983, of 1,558 workers who were monitored for radiation exposure, 655 received less than 0.1 rem. This is about the amount of exposure received by a person living in the Saramento area as a result of exposure to cosmic rays and to the earth's natural radioactivity. An additional 612 workers received from 0.1 rem to 1.0 rem in 1983. Exposures above 1 rem annually were:

No. of Persons	Dose Range (Rem)
232	1 to 2
46	2 to 3
6	3 to 4
0	Above 4

Workers having measurable exposure to plant radiation averaged 0.51 rem in 1983. Overall, this represents good control of radiation exposure. To put this average exposure in perspective, it is noted that in 1983 more than 4 million Americans received about 0.5 rem each as a result of a single medical diagnostic x-ray examination, the sacro/lumbar diagnosis.

Analysis of worker radiation records for the 1975 to 1984 period shows that only approximately a dozen SMUD employees received more than 10 rem in their career. Only 3 workers accumulated from 15 to 18 rem as a result of occupational exposure at Rancho Seco.

10.3 Control of Contamination

The radiation exposure detailed above relates to dose received as a result of radiation external to the body. Workers may also be exposed to airborne particulates which represent potential for internal contamination. Air sampling identifies such contaminated areas within the plant and, as required, protective clothing and respirators are worn. Contract workers arriving at the site and on terminating are given a whole body count to identify the presence of any internally deposited radioactivity. SMUD employees also receive periodic whole body counts. Records of these measurements are retained as documentary evidence in the worker's file. Examination of whole body count data for the 1984 steam generator work was studied and no cases of significant uptake of plant-produced radioactivity were identified.

Plant areas requiring respiratory protection are posted and entry into such areas requires an appropriate radiation work permit. Workers issued respiratory protection are required to pass medical tests and are face-fitted with a respirator.

10.4 Radiological Events

While the above radiation controls serve as an indicator of good health physics practice, one must also consider the frequency and severity of significant radiological events. An event of significance occurred during the July, 1984 outage that involved steam generator work. A piece of metal, later identified as part of a thermal sleeve for a steam generator tube, was picked up from the upper channel head of the "B" steam generator and tossed out of the steam generator hatch by a SMUD worker. A contractor radiation protection technician noted that his radiation meter went offscale and covered the thermal sleeve with a lead blanket. The area was not posted and no one was notified. Four days later the thermal sleeve was found during a survey. It was lead-blanketed, posted and supervisors were informed. Subsequently, the metal sleeve was found to measure 120 rem/hour contact. Thus, it posed a potential for worker overexposure.

An NRC Region V report, dated September 21, 1984, described the event sequence in detail and identified violations of procedures in radiation protection. These were discussed with SMUD officials at an enforcement conference held on September 28th, at which time SMUD presented a detailed chronology of the event and estimation of worker doses. A consultant was subsequently retained to evaluate potential worker extremity doses. At the present time it appears that no worker received an extremity dose in excess of allowable limits.

While the event is disturbing, because of the significant deviations from good health physics practice, it is noteworthy that Rancho Seco radiation protection technicians responded well to the event following the survey discovery and prepared an investigative report which critiqued deficiencies and made 12 specific recommendations for corrective action. Unfortunately, this report was not made available to the NRC or to the public on a timely basis.

"History page" from
LRS report

Overall, the 1975 to 1984 record of radiation protection at Rancho Seco has been good and significantly better than the PWR industry average performance. Nonetheless, an effective radiation program must be constantly implemented by in-field supervision, preferably by SMUD workers as opposed to contractors, and by continuing training and retraining of workers in HP fundamentals and in conformance to written procedures.

10.5 Chemistry

Chemistry at Rancho Seco has an unusual problem compared to most other nuclear plants in that power level changes are made at pre-planned intervals over the year as base load requirements and dispatch economics change. This imposes transient conditions on the reactor coolant and feedwater systems more often than is the case for a fully base-loaded plant. The staff chemist is a competent individual who pays attention to careful trending of the primary and secondary water parameters. Chemistry laboratory facilities are cramped and should be upgraded. Communications between Chemistry and Operations could stand improvement.

10.6 Recommendations

CRP-1 The present combined chemistry/radiation protection organization should be split into separate units to allow for upgrading the performance of each activity.

CRP-2 Supervisors need to spend more time in the plant. In particular, SMUD supervisors should not delegate their responsibility to contractor supervisors.

- CRP-3 SMUD should attempt to eliminate all contractors except during outages when more HP techs are necessary. Contract workers should be carefully screened with written examinations and their training in Rancho Seco procedures should be documented.
- CRP-4 Supervisors should make sure that technicians are aware of significant radiological/chemical events that occur at other nuclear sites.
- CRP-5 Documentation of personnel contamination should be executed carefully, including trending of significant contamination.
- CRP-6 Rigorous scheduling of all technicians should be done for training in chemistry and health physics.
- CRP-7 Supervisors should participate in lesson plan development and approve all such plans submitted by the Training Department.
- CRP-8 Radiation levels for specific plant locations should be tracked on a systematic basis and the data acquired should be trended.
- CRP-9 Communications with Operations should be improved so that both chemistry and radiation protection supervisors are aware of changed conditions in the plant.
- CRP-10 Workers should be given additional information on the health effects of ionizing radiation so that they are more aware of current knowledge in this field.
- CRP-11 Unusual radiological or chemical occurrences should be thoroughly investigated and, where advisable, summary reports should be issued on a timely basis.

- CRP-12 All workers exposed to radiation should be given written notification of their annual and cumulative plant exposure.
- CRP-13 Splitting of the C&RP organization into two units will probably require adding to the technical staff. Such additional personnel should be recruited on a timely basis and every effort should be made to obtain highly qualified individuals.
- CRP-14 Chemistry laboratory facilities should be upgraded.
- CRP-15 Dosimetry should be organized as an entity headed up by a qualified health physicist.
- CRP-16 Replacement of photographic film badges with TLD's should be considered.
- CRP-17 Radiation records should be reviewed to make certain that the data are adequate and easily retrievable.
- CRP-18 SMUD audits should be made prior to INPO audits to make certain that previous recommendations have been carried out and that new adverse findings are minimal.
- CRP-19 ALARA should report to the plant Health Physicist.
- CRP-20 Health physicists in SMUD should be encouraged to achieve certification by the American Board of Health Physics.
- CRP-21 The plant HP should prepare a quarterly tabulation of significant radiological events taking place at other sites and circulate this to training and to the RP staff.

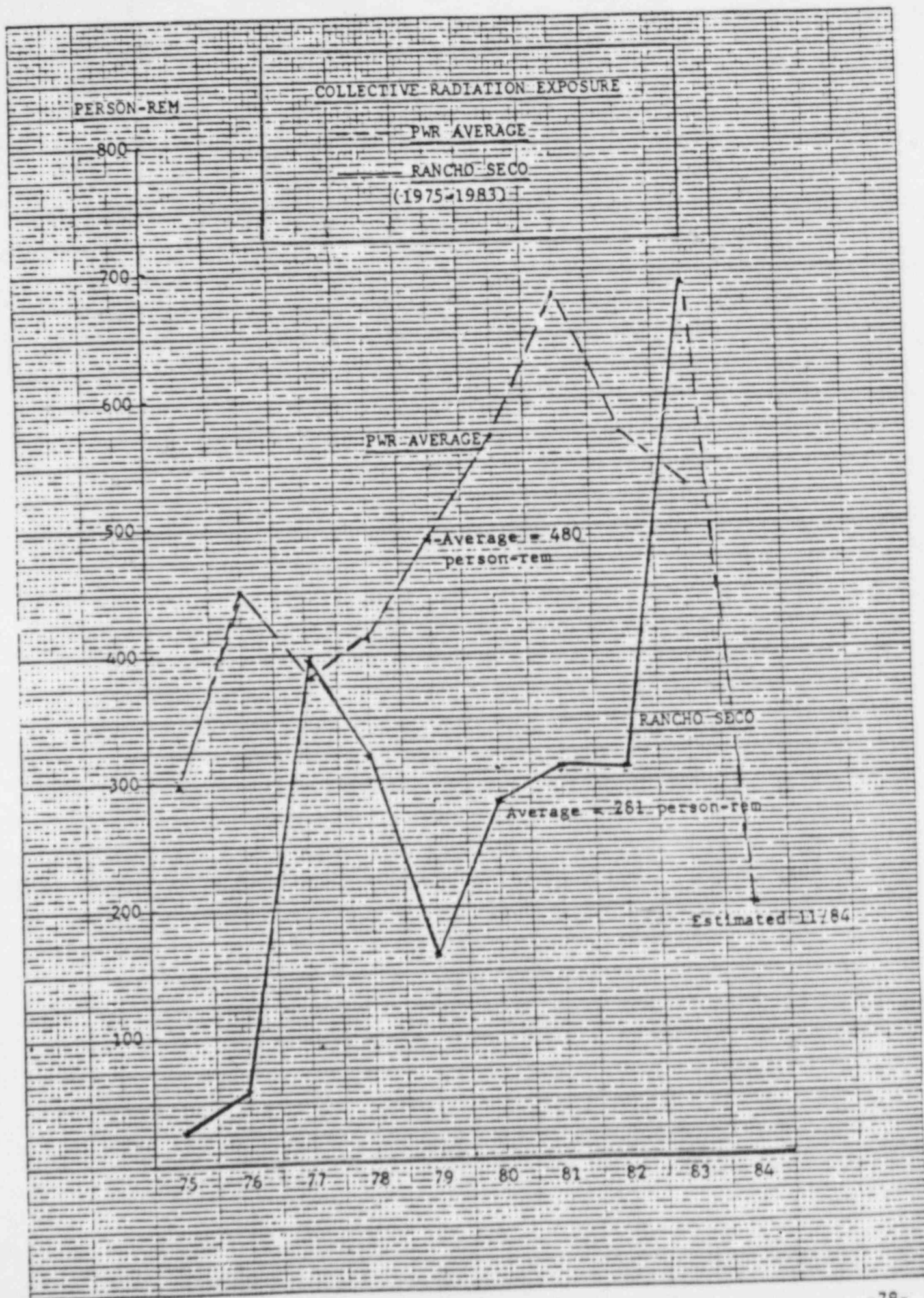


Fig. 10-1

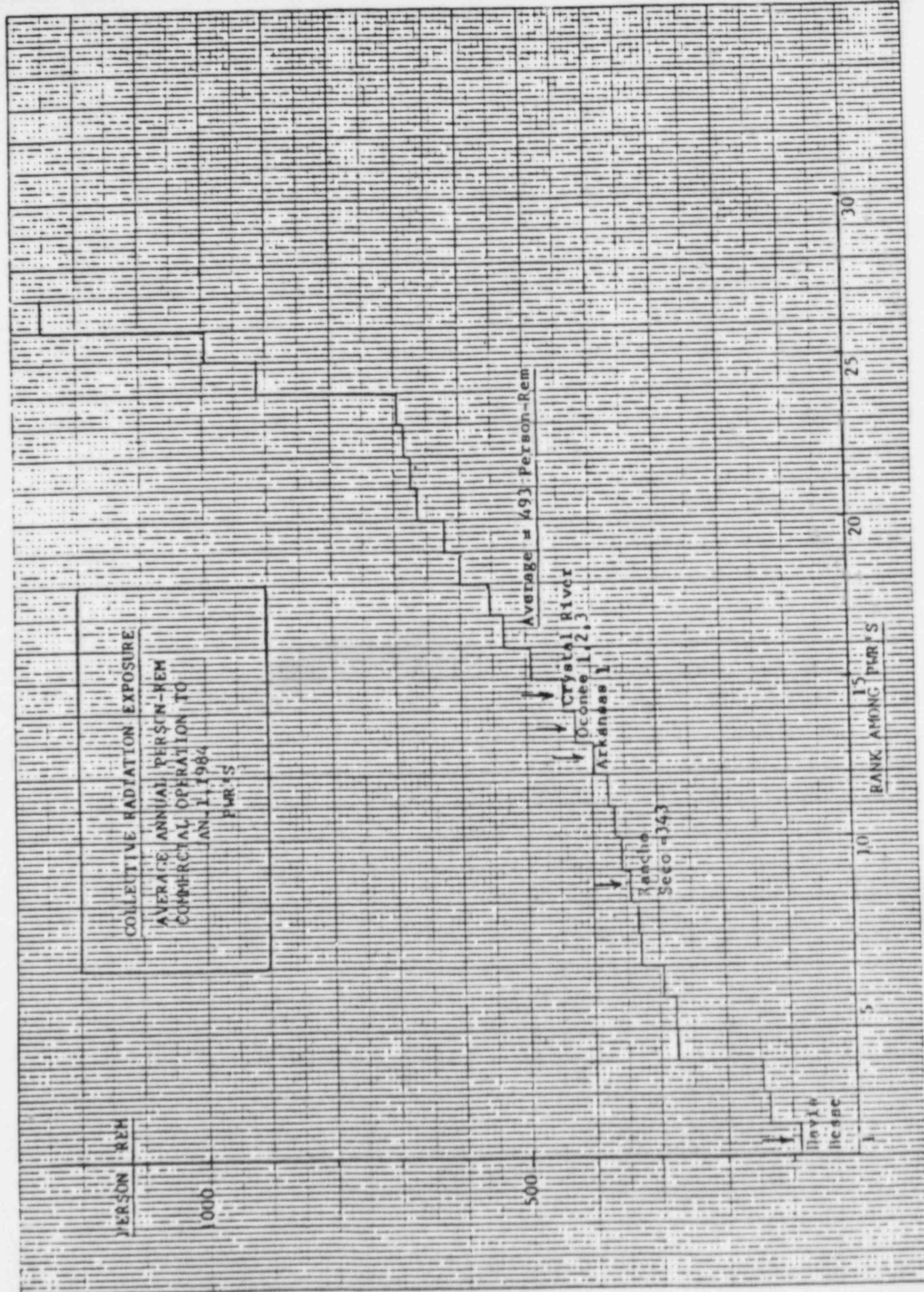


Fig. 10-2

11.0 ALARA

The present ALARA unit operates under the Nuclear Fuels Management/Health Physics organization in nuclear engineering. While this arrangement does allow for ALARA review of plant modifications, this constitutes only a small part of an effective ALARA program. A functional ALARA unit would best be located at the plant under the direction of the plant Health Physicist. The essence of good ALARA is careful review of potentially high exposure work activities and well coordinated pre-planning of jobs, followed by close ALARA coverage of and monitoring of the actual work. A free-roving ALARA coordinator provides insurance that worker dose is being kept to a minimum.

The effectiveness of the group would increase if exposure data for activities at other sites was incorporated into Rancho Seco planning and a tracking system was developed to monitor dose reductions on repetitive outage tasks.

11.1 Recommendations

- AL-1 ALARA should report as a separate function to the plant Health Physicist.
- AL-2 Insure that the ALARA function is staffed by SMUD, not a contractor.
- AL-3 Develop a detailed ALARA training program.
- AL-4 Provide the support required to insure that ALARA has high plant visibility and the management backing to terminate activities that could result in unnecessary exposure to personnel.

AL-5 Maintain detailed dose data on outage work to permit thorough post-outage ALARA analysis of high exposure activities.

AL-6 Prepare an annual ALARA report summarizing outage and annual exposure data with recommendations for achieving future ALARA goals.

12.0 EMERGENCY PLANNING

The location of Rancho Seco in an isolated area with low near-plant population density is favorable to the development of a good Emergency Plan. Radiological assessment coordination appears to be satisfactory. The Emergency Operations Facility, although more distant from the nuclear site than is common, is well designed and is adequately equipped.

Emergency Planning appears to be functioning quite well with personnel who appear to be both knowledgeable and dedicated to their work.

12.1 Recommendations

- EP-1 A qualification card system should be developed for the purpose of checking off the training requirements for persons engaged in emergency planning drills and exercises.

13.0 ENVIRONMENTAL

Steam generator tube leaks in May 1981, November 1982 and September 1983 resulted in the release of small amounts of radioactivity to waste water. Results of enhanced environmental monitoring were reported in a public document, the 1983 annual SMUD report on Effluent and Waste Disposal. These included analyses of fish, algae, aquatic plants, water, mud, silt, fresh milk, wildlife and edible vegetation. In addition, there was constant recording of off-site radiation at 29 close-in off-site stations as well as at 15 stations out to a distance of 24 miles from the site.

Examination of the data indicate that off-site exposure of the general population has been minimal and less than the normal variations that occur in the natural background due to extraterrestrial radiation and terrestrial radioactivity. We believe that the public health and safety has been well protected. Furthermore, there has been full disclosure of environmental monitoring data. However, Rancho Seco represents a dry land site, unlike reactors located on or near lakes or rivers, which serve as a dilutant for disposal of liquid radioactive wastes.

NRC regulations specify the computation of dose to a "member of the public" through analysis of the critical pathway, in this case, the liquid pathway, to the individual. It is a very conservative calculation that leads to an over-estimate of dose. The 1983 Effluent and Waste Disposal report estimated a 0.1 rem whole body dose for radio-cesium uptake through the fish-to-man pathway. Regulatory Guide (NRC) 1.109 specified an annual fish intake of 46 pounds of fish. A more realistic estimate of actual dose is obtained by making a whole body count and here a measurement of the most probable dose to the individual showed no significant retention of cesium-134 or 137. By way of perspective, a person who caught fish in a downstream pond demonstrated an insignificant body burden of radiocesium. This was less than that common for most Americans following global fallout of radioactivity from atmospheric testing.

SMUD has undertaken extended surveys of downstream radioactivity uptake in the flora and fauna outside the plant protected area. The release of radioactivity to the water pathway has been monitored and from 1980 through the first quarter of 1984 the total quantity of cesium-137 released amounted to 0.335 curies. Uptake of this radioactivity by fish (bluegills and large mouth bass) has been measured in numerous fish samples and has a mean value of 4.3 picocuries (0.0000043 millicuries) per gram of wet flesh. An ingestion of 46 pounds of such fish each year would imply a body dose of .012 rem per year. This would be about half the annual dose delivered by the naturally occurring radioactive potassium (K-40) in one's body.

Additional perspective on radiation dose to humans is supplied from the annual dose data collected at the 44 stations located outside the Rancho Seco protected area. A station located at the Jackson Civic Center, 10 miles east of the site, registered 0.091 rem per year in 1983. This radiation dose, due to natural radiation, was 20% higher than the comparable annual dose measured at seven on-site stations. These measurements are supplemented by independent observations taken at NRC and State stations, which validate the SMUD findings.

Scientists from the Lawrence Livermore National Laboratory (LLNL) have been retained to provide an independent assessment of the plant-dispersed radiocesium.

13.1 Recommendations

EV-1 SMUD should consider reorganizing its environmental section, which now reports to the manager of Nuclear Engineering, so that there is better evaluation of the NRC RETS program. This could be done by assigning responsibility for environmental programs to the Plant Health Physicist.

EV-2

The LLNL report on radiocesium releases should be released to the public as soon as feasible along with a cover statement summarizing the results in a manner that will be easily understood.

EV-3

SMUD should make available to the media and to the public an annual summary of its environmental findings, expressed in a form that permits easy public comprehension.

14.0 PROCUREMENT AND STORES

The recent re-organization that placed all of the warehousing under control of a single organization was a proper move. However, the concept of mixing safety and non-safety related items together is a questionable practice.

Some specific observations related to Procurement and Stores activities are as follows:

- o Commercial grade items are generally treated as Class I by site QA; however, the written rules regarding commercial grade are less stringent than those for safety-related Class I.
- o In the warehouses on site, Class I, II, commercial grade and non-class items cannot be visually identified as different from each other, either by their location in the warehouses or by identification on the item.
- o Some items on hold in the warehouses are co-mingled with acceptable items.
- o Some warehouse personnel have not received adequate training in the QA requirements for storage and identification of safety related items.
- o The system relies on the Stores Department stock records cards for proper classification of items, i.e Class I, II or commercial grade. However, not all stock records cards have been reviewed for classification. The practice has been to review the classification when it is necessary to re-order the item.
- o Audits by QA of the warehousing (storage) practices have not detected any problems.

- o SMUD'S involvement with PIM (Pooled Inventory Management) is an excellent move. The availability of critical spares is greatly enhanced by SMUD's involvement in this program.
- o Access into and out of the warehouses is loosely controlled.

14.1 Recommendations

PS-1 Re-evaluate the system for procurement of commercial grade items that are to be used in Class I systems to assure that these items have received adequate Engineering, QA and QC attention from the initiation of the purchase requisition through item storage and installation at the site.

PS-2 Consider a separate nuclear purchasing group within the General Office Purchasing organization whose sole duties are to perform nuclear grade purchasing activities. These people should have had prior experience in nuclear purchasing and be properly trained and indoctrinated in the QA program and procedures.

PS-3 Revise the present practice of co-mingling Class I, II, and commercial grade items with non-class items in storage. Also institute a system for positive visual identification of safety-related items. Attendant with this recommendation is training the appropriate personnel in the new system.

PS-4 Establish a more positive system of control for entrance to and egress from the safety-related storage facilities.

PS-5 Expedite the placement of item classifications on the stock records cards.

15.0 RECORDS MANAGEMENT AND DOCUMENT CONTROL

The Station has established a small, but solid, core of knowledgeable records management personnel. The scope of their activities is still somewhat limited from an overall nuclear program aspect and staffing has come along slowly, but steadily. The organization has good facilities and equipment and is well organized and managed.

Document control in areas other than that controlled by the Records Management section is somewhat disjointed and lacks an overall plan.

Some specific observations related to records management and document control are as follow:

- o There is no station administrative procedure or quality control instruction on document control.
- o The Technical Manual library was transferred from control of Records Management to Maintenance.
- o There is no requirement for the sections within the different nuclear departments to purge their active files on a routine basis in order to get their records to Records Management for microfilming on a timely basis.
- o The only records storage facility at the site that meets all of the regulatory requirements is under control of site QA.
- o Site QA stores their QA records in their vault in file cabinets and boxes. Entry into the vault is not well controlled and the records staff is minimal and not trained in records management. The QA Program Manual states that the records will be stored in accordance with the 1983 edition of ANSI/ASME standard NQA-1 supplement 17S-1. This is not being implemented.

- o A principal delay in the microfilming of the work requests is in Maintenance while the Maintenance History information is being entered in the computer for MIMS.
- o There is no limit to the number of yellow sheets that can be outstanding against a drawing. This means that the Operator may have to look through many yellow sheets before he can determine the current status of his plant. Also, if the drawing he is looking at has a pink sheet against it that has been completely pre-operationally tested but a yellow sheet has not been issued yet, then that information will not be available to the operator on a yellow drawing for 24 to 48 hours.
- o All 25,000 original drawings for Rancho Seco are stored in the trailers in "design city." A fire in these trailers would be of serious consequence, even though most of the drawings are stored in 4 hour fire-rated files and microfilm copies are stored elsewhere.
- o There does not appear to be an overall system for forms control, e.g. when a form is changed the procedure with the form in it does not necessarily get changed and the old copies of the forms are not purged from the system in a timely manner.
- o Procedure control at the station, except for Special Test Procedures, is controlled by the Administration group of the Nuclear Administration section. The present staff assigned to this activity is minimal.
- o All of the station procedures have been microfilmed.

- o Control of QA documents within the site QA organization is not in accordance with a formal system that assures they do not get lost and that they are processed expeditiously.

15.1 Recommendations

- RMDC-1 Establish a single Records Management/Management Information system for Rancho Seco using the site records management organization and system as a basis.
- RMDC-2 Assign control of the records vault to Records Management, provide funding for high density records storage equipment for the vault and provide qualified staff to operate the facility.
- RMDC-3 Provide additional qualified personnel to the maintenance organization to accelerate their handling of work request information into MIMS.
- RMDC-4 Perform a study and action plan to determine the impact of a major fire in "design city" and the precautions to be taken to prevent same. Consideration should be given to providing permanent facilities.
- RMDC-5 The Technical Manual library should be returned to the control of Records Management (see Recommendation MA-7).