I. INTRODUCTION

A. Purpose

The purpose of this report is to examine the existing electrical distribution system of Mt. Wheeler Power, Incorporated and to plan for its orderly expansion. All improvements made since the last study have been incorporated into the overall design of the system. The existing system facilities are utilized whenever possible. When calculated data indicated the need for improvements, corrective measures were recommended.

All improvements recommended in Load Block "A" should be incorporated into a Four-Year Work Plan. Hereafter, Load Block "A" should be considered as a Four-Year Work Plan.

This plan provides management with an outline for the system growth expressed in terms of the investments associated with major facilities and corresponding load levels. The load levels at which the investment requirements are specified in this study can be used to relate expenditures to a time scale for financial forecasting. Reference to this study and to future revisions as system additions are planned, will accomplish the following objectives:

1. An orderly development of the system in order to minimize waste resulting from facilities becoming inadequate early in their service lives.

2. System expansion in a manner that investment in new facilities is compatible with load growth and revenue.

3. Maximum use of opportunities to improve quality of service.

4. Maximum use of anticipated developments in equipment design and application.

5. Coordination of the various components of the power supply and distribution system so as to maintain a reasonable economic balance between them.

II. GENERAL DESCRIPTION OF THE REPORT

A. Summary

Load Block "A" (Four-Year Work Plan) presents a detailed study of improvements needed to expand the capacity of this system. The projected coincidental peak demand anticipated during the next four years is 52 MW, excluding all special mining loads. The Work Plan is designed to be a guide to system expansion and to assist

the system operation by serving as a ready reference of system configuration and capacity.

Load Block "A" (Four-Year Work Plan) was divided into four, one-year sections. The recommended improvements have been designed for each of the four years of the Work Plan. Likewise, cost estimates have been summarized separately for the four years.

The plan proposed within this report should be considered as a general guideline for system improvements. Since actual future load growth and other factors affecting system development may vary, it is the recommendation of the Engineering Department that the Cooperative review this plan periodically to see if modifications of the plan are required. Actual line construction should, therefore, be based on recommendations resulting from current and future construction work plans. Used in this fashion, the proposed long range plan and transition plans should permit maximum utilization of existing facilities while avoiding the installation of new facilities not used in long term.

The following report was referred to in the preparation of this study:

1. 1991-1992 Two-Year Work Plan prepared by Mt. Wheeler Power, Incorporated.
2. 1997-2000 Four-Year Work Plan and Long Range Plan prepared by Southern Engineering.
3. 2004-2007 Four-Year Work Plan prepared by Mt. Wheeler Power, Inc.
4. Current consultations with Power Engineers of Hailey, Idaho.

B. Conclusions

The Cooperative is providing adequate, dependable service to its consumer-members at the present time. During the next four years, voltage regulation problems will occur at some points in the system. To correct these problems, it is recommended that the cooperative construct new lines plus purchase and install voltage regulators so that voltage levels may be maintained. In addition, it is recommended that the Cooperative re-insulate and convert existing city and town 2,400 V Delta systems to 14.4/24.9 kV so that voltage levels may be maintained.

C. Recommendations

It is recommended that the Cooperative adopt this report as its distribution system planning guide. All future additions to the system should be in accordance with this report or subsequent revisions thereof.

Due to high fixed costs associated with plan investments, it is recommended that the Cooperative make a careful study of each improvement before it is installed.

III. EXISTING SYSTEM ANALYSIS

A. Criteria

The historical substation peak kW demand and individual consumer's installed transformer kVA were used as the basis for the development of the system model.

This Work Plan was based on the following criteria:

Coincidental kW Demand	52 MW
Voltage Drop Limitation (120 Volt base 5%)	6 Volts
With Regulators	12 Volts

In designing Mt. Wheeler Power's Four-Year Construction Work Plan, system voltages throughout the system were taken into consideration. The maximum voltage drop on primary distribution lines was based upon a 120 volt base (5% bandwidth) and not exceeding 6 volts drop after line regulation. This maximum allowable voltage drop is in accordance with RUS Bulletin 169-4. Other criteria used in developing Mt. Wheeler Power's Four-Year Work Plan were the thermal loading of conductors. Conductors used for primary line shall not be loaded more than 70% of their thermal rating. By the limitation of the primary lines, we are able to reduce losses while also producing substantial tie-lines between substations so that load may be shifted during emergency situations. Conversions to multi-phase lines to correct voltage drops and to improve phase balance will be made on single-phase and two-phase lines operating at 14.4/24.9 kV. Operating and engineering practices used to develop the loading criteria area were based on a single-phase line interruption which may cause operation of a ground trip device of a three-phase recloser or breaker. Also, the conversion of single-phase lines to multi-phase lines was indicated within this work plan to correct both voltage drop problems and sectionalizing problems or a combination of both. Multi-phasing of distribution lines was recommended in the following situations:

1. When the calculated voltage drops indicated voltage drop problems, multi-phasing was recommended to solve these problems while also being able to solve imbalance which may exist on long feeder lines.

2. Multi-phasing was also considered on single-phase lines which exceeded 45 amps and the available fault current limits recloser size of 50-amp continuous rating.

3. In order to improve voltage drop problems, reduce line losses, and replace facilities, some of which have been in service since the 1920 and 1930s, conversion from 2400 V Delta and 2.4/4.16 kV-Y to 14.4/24.9 kV was recommended.

B. Service Area

The Cooperative serves an extensive area in eastern Nevada and western Utah. The Cooperative has services within the following counties:

1. Nevada (White Pine, Eureka, Elko and Nye).

2. Utah (Juab, Millard and Tooele).

C. Load Characteristics

Overall, the type of load growth Mt. Wheeler Power, Inc. is currently experiencing reflects the trend in the sparsely populated areas. That is to say, a moderate load growth for the most part in the rural areas, but having a higher load growth in areas that are urban or border urban areas or along state highways.

Over the time period covered by this study, it is reasonable to assume that the current load growth in the rural areas will be modest and that most of the abrupt rise in load growth for this Cooperative will be seen in areas that border larger towns, cities, etc.

D. System Capacity

A review of the system load and voltage calculations for the existing system with kW demand and individual consumers installed transformer loading indicates that the system line capacity is adequate to handle present load levels. However, it is evident that additional substation and line improvements should be added during the Four-Year Work Plan to continue to provide adequate service.

1. GONDER SUBSTATION #1

Transmission Step-Down Transformer (230-69 kV). Present capacity is 32 MVA and ultimate capacity is 40 MVA (FOA) for each transformer. Latest peaks have been approximately 23.1 MVA for summers and 26.3 MVA for winters.

Distribution Substation Transformer (69-24.9Y/14.4 kV). Capacity of this 7,500 kVA transformer is adequate with the addition of cooling fans increasing its rating to 10,500 kVA (FA). Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 5.5 MVA and winter 8.2 MVA.

2. MACHACEK SUBSTATION #2

Transmission Step-Down Transformer (230-69 kV). Capacity of the two 24 MVA transmission transformers is adequate we just have to correct a voltage fluctuation situation. Latest peaks have been approximately 16.5 MVA for summers and 8.7 MVA for winters.

Distribution Substation Transformers (69-24.9/14.4 kV). Capacity of the initial transformer was increased to 22,400 kVA (FA) by the addition of additional fans. In 1998, a second transformer was added to support this unit. Parallel operation of the two transformers, if required, could be accomplished with additional equipment and engineering. Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 13.6 MVA and winter 4.4 MVA.

3. MURRY SUBSTATION #3

Distribution Substation Transformer (69-24.9/14.4 kV). Capacity of this 7,500 kVA transformer is adequate. Cooling fans increase the capacity to 8,400 kVA (FA). Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 3.0 MVA and winter 5.0 MVA.

4. GIANOLI SUBSTATION #4

Distribution Substation Transformer (69-4.16Y/2.4 x 12.5Y/7.2 kV) operating at 4.16/2.4 kV. Capacity of this 7,500 kVA transformer is adequate for the work plan period. Some additional load in East Ely has been transferred from this transformer to the 24.9Y/14.4 kV Gonder/Murry lines. Cooling fans increase the capacity to 8,400 kVA (FA). Without accurate reads the load is estimated to be ~7 MVA winter and less in summer.

5. GRIGGS SUBSTATION #6

Distribution Substation Transformer (69-24.9Y/14.4 kV). Capacity of this 5,000 kVA transformer is adequate. Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 950 KVA and winter 520 KVA.

6. BAKER SUBSTATION #7

Distribution Substation Transformer (69-24.9Y/14.4 kV). Capacity of this 3,750 kVA transformer is currently being approached. The addition of cooling fans increase this transformer's capacity to 5,400 kVA (FA). Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 4.2 MVA and winter 2.8 MVA.

7. WILLIAMS SUBSTATION #8

Distribution Substation Transformer (69-24.9/14/4 kV). Capacity of this 5,000 kVA transformer is adequate. The addition of cooling fans could possibly increase this transformer's capacity to 8,400 kVA (FA). Non-coincidental peaks from recloser readings at ~ 20% diversity are summer 4.3 MVA and winter 3.1 MVA.

8. TAYLOR SUBSTATION #13

Taylor (Mine) Substation Transformer (69-4.16Y/2.4 kV). This 5,000 kVA transformer is adequate for presently planned loads and the fan cooled rating is adequate for the future loads as planned by an interested mining company.

E. Substations

Mt. Wheeler Power, Incorporated provides service to its consumers from eight distribution substations which are owned by Mt. Wheeler Power, Inc. Mt Wheeler Power assumes responsibility for all maintenance and capacity increases on existing substations and installation of new substations when required.

F. Maintenance

Other Maintenance programs include annual infrared testing, periodic checks and servicing of switches, OCBs, OCRs, right-of-way clearing, etc.

G. Energy Losses

System energy losses have been calculated for the five-year period ending December 2005. The tabulations indicate that losses have varied from 8.04% to 3.22%.

H. Design Data

For the purpose of this analysis, each substation area represents a usage area. Using this data, along with projections of measured peak kW demand for each source, a projected load was determined for each substation or metering point area.

I. Load Balance

In making the load balance, it was assumed that all consumers in a usage area would place the same demand on the system. Necessary tap changes will be made to obtain an adequate load balance.

J. Physical Condition

The physical condition of the system, determined by routine inspections, is considered to be satisfactory. Mt. Wheeler Power, Inc. has had the distribution pole system periodically inspected and is currently investigating the opportunity to have the transmission poles inspected.

IV. FOUR-YEAR WORK PLAN CONSTRUCTION PROGRAM

A. Discussion of System Improvements

The system improvements that will be required during the next four years to expand the capacity of the system to meet new consumer demands and accommodate usage increases by existing consumers will be discussed as they appear on the 2007-2010 Work Plan Substation Schedule. The improvement numbers are based on RUS classifications in order to identify the type improvement as follows:

Code 200:	New Line Construction
Code 300:	Line Conversions
Code 400:	New Substation
Code 500:	Substation Changes /Improvements
Code 600:	Sectionalizing/Regulation
Code 1100:	Transmission Line Air-Break Switches

GONDER SUBSTATION #1

The Gonder Substation is located in the central portion of the Cooperative's service area. The projected peak demand for this 230/69 KV substation during the time period covered by this work plan is 46 MW. The highest peak lately has been ~ 26 MW and Sierra Resources is currently requesting a 69/25 KV substation at Duck Creek for 20 MW for 2008. This may take a new 69KV SF6 breaker, a new 69/25 KV substation transformer near the Duck Creek turnoff w/an OLTC, circuit switcher, regulators, 69 KV overhead transmission line, etc. All is not known yet as we have just started meeting with SPPCO this last month concerning this load requirement. LS Power may open negotiations again and require load which we do not know as of yet. The 2303 Breaker needs to be replaced due to difficulty in finding replacement parts, its age and possibility of failure in the 230 KV bus.

The 69/25 KV substation is nearing its peak and with the additional growth foreseen by the construction of the Sierra Resources Power Plant we are looking at ~2.5 MVA for water well loads and ~5 MVA for 1,500 units or more man camp facilities. This would require another 69/25 KV substation transformer with a circuit switcher, etc. at Gonder with a capability to handle future growth of ~17 MVA. We would also have to build more distribution lines to feed this new load. With this we could possibly split the load at times but still have one 69/25 KV transformer to handle load out of Gonder.

Overall, the Gonder Substation is in good condition for an aging substation. It is, however, recommended that the 69KV OCB's be inspected for possible replacement, over a period of time, in the Long Range Plan due to the age and deterioration of the original units.

In the Gonder Substation service area, the conversion of 4.6 miles of 2.4/4.16 kV distribution line will need to take place. These conversions consist of the reinsulation and conversion of 2.4/4.16 kV lines within the town of McGill. These improvements need to take place in order to improve system reliability, voltage levels, reduce line losses and replace existing facilities.

MACHACEK SUBSTATION #2

The Machacek Substation is located in the northwestern portion of the Cooperative's service area. The projected peak demand for this 230/69 KV substation during the time period covered by this work plan is 20.7 MW. Bald Mtn Mine is looking at increasing their load by ~1 MW and maybe more. Power Engineers and Mt. Wheeler Power have been calculating the capacity of the 69 KV line feeding the site. We have not

heard anything definite as of late. Mt. Hope is investigating the possibility of their mining operation, 39 MW, which would be fed from the 345 KV line of SPPCO or the 230 KV line out of Machacek Substation.

The 69/25 KV distribution peak load would be ~ 18 MW. The well field for Mt. Hope would be fed from the 69/25 KV DVW line for ~2 MW. Another mine has been investigating the possibility of tying into the 69 KV line in Newark Valley to feed a 750 KW load near Mt. Hamilton. Homestake Mining may bring on an unknown additional 25 KV load also.

Overall, this substation is in good condition; however, the concentric neutral on the underground cable serving all irrigation loads is in need of replacement due to aging and deterioration of the original cable. It is, therefore, recommended that the Cooperative continue with their underground cable replacement program to better serve its irrigation load.

The Cooperative has continued with their program whereby a number of single-phase hydraulic reclosers are replaced each year with new electronic reclosers.

MURRY SUBSTATION #3

The Murry Substation is located in the central portion or the Cooperative's service area, near the town of Ely, Nevada. The projected peak demand for this substation during the time period covered by this work plan is 6 MW. There is a number of residential subdivisions coming in but we have not seen any commercial load requests.

To insure that system reliability is maintained throughout the town of Ely, as well as maintaining voltage levels, reducing line losses and replacing aged outside plant, some of which dates back to the 1920-30's, it is recommended that the cooperative re-insulate and convert that portion of the Murry Canyon currently operating at 2.4/4.16 kV to 14.4/24.9 kV.

To assist in maintaining the Railroad Valley/Nyala circuit, in the case of an emergency condition in Williams Substation we will perform maintenance on the existing "retired 34.5 kV line" near the Lone Tree Substation to the Blackjack/Lund turnoff. Once this is in operating condition we will be able to tie that circuit to the Murry Substation which has plenty of capacity to handle the additional load.

GIANOLI SUBSTATION #4

The Gianoli Substation is located in the central portion of the Cooperative's service area. This substation serves the main part of the town of Ely, Nevada. The projected peak demand for this substation during the time period covered by this work plan is 6 MW.

To insure that system reliability is maintained throughout the extremities of this substation's service area, as well as maintaining voltage levels, reducing line losses and replacing existing facilities, some of which date back to the 1920-30's, several improvements are being recommended for the time period covered by this Work Plan.

The greatest improvement being recommended is the relocation/replacement of the entire substation to a location on Campton Street east of the original site. This will

allow ease of access, alleviate safety violations, allow maintenance with minimal outage times and give accessibility to construct a sub with newer recording reclosers to allow better control and supervision of the Gianoli circuits. This would also entail five new feeders be built to feed the existing loads.

The 2400/4160 Volt circuits may be best left on the system with regular maintenance.

GRIGGS SUBSTATION #6

The Griggs Substation is located in the northern portion of the Cooperative's service area. The projected peak demand for this substation during the time period covered by this work plan is 1.2 MW.

Overall, the Griggs Substation is in fairly good condition. It is, however, recommended that the substation reclosers and respective control panels be replaced due to the age and unavailability of parts to perform maintenance on these units.

BAKER SUBSTATION #7

The Baker Substation is located in the eastern portion of the Cooperative's service area. The projected peak demand for this substation during the time period covered by this work plan is 5.5 MW

To insure that system reliability is maintained throughout the substation area (south), as well as maintaining adequate voltage levels, reducing line losses and replacing outside plant, some of which dates back to the 1920-30's, it is recommended that the Cooperative re-insulate and convert the town of Garrison from 2.4/4.16 kV to 14.4/24.9 kV.

The Cooperative has continued with their program whereby a number of single-phase hydraulic reclosers are replaced each year with new electronic reclosers.

WILLIAMS SUBSTATION #8

The Williams Substation is located in the southwestern portion of the Cooperative's service area. The projected peak demand for this substation during the time period covered by this work plan is 6.5 MW.

Overall, the Williams Substation is in fair condition. This substation would best be served with a spare 7.5 MVA substation transformer with circuit switcher in order to best serve our consumers.

TAYLOR SUBSTATION #13

The Taylor Williams Substation is located in the southwestern portion of the Cooperative's service area. The only load on that substation is a manufactured home and a couple of security lights. A 100 hp water test well is to be energized the fall of 2006 for possible future mining usage.

The Taylor Substation is in fairly good condition.