

**IMPACT OF THE KITT PEAK ORDINANCE
ON STREETLIGHT RATES**

May 1984

Prepared For:

MARICOPA ASSOCIATION OF GOVERNMENTS

By:

MURPHY ENGINEERING

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CHAPTER I

INTRODUCTION

Since May of 1982, the Maricopa Association of Governments (MAG) has been studying the problem of atmospheric light pollution in Arizona. Outdoor lighting illuminates large areas above and around cities, causing an artificial sky glow that interferes with the nighttime observations of astronomers. The situation has already reduced the efficiency of statewide research facilities. If not remedied, it will have a growing adverse effect on the state's astrophysical research activities.

MAG's first step was to establish a Kitt Peak Task Force to review the light pollution problem and investigate the feasibility of adopting a Model Light Control Ordinance proposed by Kitt Peak National Observatory. The task force concluded that although there was an immediate need for all MAG communities to support the proposed ordinance, existing utility rate structures for street lighting presented barriers to cost-effective implementation.

A Subcommittee of Public Works Directors from seven MAG communities and Maricopa County was then named to fully investigate the impact of utility rates and rate structures on the implementation of the Light Control Ordinance. That group has examined the rates charged by Salt River Project (SRP) and Arizona Public Service (APS), as well as Sulphur Springs Valley Electric Cooperative (SSVEC). SSVEC was included because, unlike SRP and APS, its rates allow for low pressure sodium security lighting -- a type of lighting preferred under the ordinance.

The purpose of this report is to discuss and analyze the street lighting rates of the above utilities, and determine the feasibility of adopting the Light Control Ordinance within MAG area communities. The following topics will be covered:

1. The Kitt Peak Ordinance -- requirements as compared to recommendations.
2. Streetlighting Rates -- review of current and proposed rates and rate designs.
3. Rate Analysis -- authorization and design mechanisms, individual rate comparisons.
4. The Ordinance versus the Rates -- interplay and conflicts between the two.
5. Problem Identification and Potential Solutions -- summary of issues revealed by the analysis.

Although we will provide copies of all of the current rates in the appendix of this report, we will discuss here only four lamp types from the 12 available in order to simplify the comparisons and assist in the understanding of the rates. These four lamps comprise approximately 90% of the utility billing amounts.

CHAPTER II

LIGHT CONTROL ORDINANCE

This chapter will review the Light Control Ordinance prepared by Kitt Peak National Laboratories for adoption by local Arizona jurisdictions. The major focus will be upon how the ordinance affects street lighting since the cost effectiveness of compliance in this area has been questioned by the MAG Kitt Peak Task Force.

Purpose

The ordinance aims to control outdoor light pollution by restricting the use of artificial illuminating devices that emit undesirable rays into the night sky and have a detrimental effect on astronomical observations.

Scope

The ordinance applies to "all outdoor artificial illuminating devices, outdoor fixtures, lamps and other devices, permanent or portable, used for illumination or advertisement." This includes search, spot, and flood lights for buildings, recreational areas, parking lots, landscaping, billboards, signs, and street lighting.

The ordinance does not apply to light fixtures installed before the effective date of the ordinance unless they are replaced, structurally altered, or restored after that date.

Requirements and Recommendations

When considering the issue of cost effectiveness, it is important to differentiate between what is required by the ordinance and what is merely recommended. This section will discuss those differences as they apply to the following types of street lighting:

1. Low Pressure Sodium - The type preferred under the ordinance due to its minimal adverse effect on astronomical observations. There are no such installations in the MAG area.
2. Mercury Vapor - The most common type of lighting in the MAG area.
3. High Pressure Sodium - The second most common type of lighting in the MAG area.
4. Incandescent - The third most common type in the MAG area.

The following matrix displays how the requirements and recommendations for shielding and filtering apply to new and existing street lighting fixtures.

LIGHTING TYPE	SHIELD	FILTER	SHIELD	FILTER
Low Pressure Sodium	No Installations To Date		Partial Req'd	None
High Pressure Sodium	Full recom'd	None	Full req'd	None
Metal Halide	Full recom'd	Recom'd	Full req'd	Req'd
Incandescent	Full recom'd	None	Full req'd	None
Mercury Vapor	Full recom'd	Recom'd	Installation prohibited	

Requirements

The most substantial requirement in the ordinance applies to mercury vapor lighting. Installation of mercury vapor fixtures would be prohibited effective 90 days after ordinance adoption.

Two other requirements deal with the shielding of light emitted from outdoor fixtures installed 90 days after the ordinance takes effect. They do not apply to existing fixtures.

Newly installed high pressure sodium and incandescent lamps greater than 150 watts must be fully shielded so that light rays emitted -- either directly by the lamp or indirectly by the fixture -- are projected below a horizontal plane running through the lowest point of the fixture where light is emitted.

Low pressure sodium lamps must be partially shielded so that the bottom edge of the shield is below the plane center line of the lamp, minimizing light above the horizontal.

Recommendations

Recommendations deal with both the shielding and the filtering of emitted light. They do apply to existing fixtures.

Existing high pressure sodium and incandescent lamps greater than 150 watts should be fully shielded as defined above.

Existing mercury vapor fixtures should be fully shielded and equipped with a filter whose transmission is less than 10 percent total emergent flux at wavelengths less than 4,400 angstroms. Total emergent flux is defined as between 3,000 and 7,000 angstrom units. Most glass, acrylic, or translucent enclosures satisfy these requirements. (Glass is the common enclosure in the MAG area.)

As noted above, the ordinance gives preference to low pressure sodium lamps due to their minimal adverse effects upon astronomical observations. (There are no low pressure sodium street lights in the MAG area.)

Compliance and Enforcement

Individuals planning to install outdoor lighting fixtures as part of a construction project will submit evidence that such fixtures comply through the regular building permit process. Other individuals can submit an application to the zoning inspector. Utility companies would agree under contract to comply with the regulations as they apply to all lighting projects.

Zoning inspectors may approve methods and materials not prescribed in the ordinance if the substitutes meet the intent of the ordinance.

If the ordinance is found to be in conflict with federal law, state law, or another ordinance, the most restrictive will govern.

Facilities owned, operated, or protected by the Federal or State government are exempted by law from all requirements of the ordinance. Zoning inspectors may grant special exemptions when extreme geographic or geometric conditions warrant. The ordinance also contains a process for the granting of a 30-day renewable exemption.

Individuals violating the ordinance are guilty of a Class II misdemeanor punishable as prescribed by the Arizona Revised Statutes. A separate offense is committed each day during which the violation is continued.

The term "individual" includes tenants, lessees, owners, and commercial entities. It is not limited to companies, partnerships, joint ventures, or corporations.

CHAPTER III

STREET LIGHTING RATES

Electric utilities own the majority of the street lights in Maricopa County. In Phoenix, SRP and APS own 96% of the street lights.

Members of the task force interviewed representatives of APS and SRP to discuss the existing rates and examine the method of rate design.

The following characteristics of street lighting were determined:

1. Street lighting is priced by lumen (light) output--not kilowatt hours (kWh's).
2. The key component of the cost of street lighting is the initial investment which is amortized over a 20 to 24 year period.
3. Available rates cover the following lighting sources: incandescent (no longer offered), mercury vapor, high pressure sodium, and metal halide (APS only). Neither utility offers a low pressure sodium rate.
4. It was difficult to discern the relationship between the efficiency of the light source and the monthly price.

At this point, a Subcommittee of Public Works Directors - Kitt Peak was formed to more closely examine how the Kitt Peak Ordinance would impact street lighting costs.

Presentations on street lighting were arranged with SRP, APS, and Sulphur Springs Valley Electric Co-op.

Pricing

Street lighting rates, as all rates are primarily based on averages.

	<u>% of Total Cost</u>
Administrative and General Costs (Overhead)	10
Taxes (Mainly Ad Valorem)	11
Operation and Maintenance	29
Capital Recovery Factor	<u>50</u>
	100

The cost of money (interest) is reflected in the capital recovery factor.

The two important approaches to street light pricing are average costs and marginal costs. Both are often used to measure changing prices.

Average costs include all investments in lights that are still in service and usually reflect straight line depreciation. There is no distinction between old lights and new lights.

Marginal costs look only at the cost of providing one more item (i.e., an additional high pressure sodium light). They are sometimes included in pricing to convey a message. If, as in the case of high pressure sodium, the new lights cost less than the average cost of all of the existing lights, a lower (marginally based) price could communicate this lower cost/price and possibly encourage their use. This is an approach that is becoming more accepted, but it must be properly managed.

Any time a utility customer pays less than the average cost, another customer must pay more than the average. This requires a judgement as to where to obtain the forgone revenue. In this case, a probable choice is mercury vapor lights because although there are many existing fixtures, cities are not presently choosing mercury vapor for new installations.

The price of power for street lighting was quoted as 3.16¢/kWH. This is made up of two components:

The demand component (investment, taxes, etc.) was 0.28¢/kWH and the energy component (fuel and operation, etc.) was 2.87¢/kWH. The low demand charge is a result of the off peak nature of street lighting.

Shielding

SRP believes that shielding not only satisfies the ordinance requirement, but in some cases can increase the light level on the street. Generally, the Project charges one price with or without the shielding.

Low Pressure Sodium

SRP's view is that although low pressure sodium has a higher lumen per watt (the light source measure of efficiency), the difficulty in controlling the light pattern and other problems have removed this source from consideration. An SRP study of the low pressure sodium option is being updated.

UTILITY RATE PRESENTATION - APS

APS is regulated by the Arizona Corporation Commission through formal rate case proceedings.

Of interest was a recent ACC decision that will raise the cost of street lighting. This decision (#53615) stops the company from continuing to use the "addendum approach" in calculating street light costs and mandates a method "that reflects the unit investment for each lamp." The addendum approach assumes that the generation, transmission, and distribution facilities will be in place whether or not there is street

lighting. As a result, the addendum approach only includes the costs of the street lights, poles, and interconnecting lines. Said another way, the marginal cost of generation, transmission, and distribution is zero for street lighting because it is basically off-peak. This change in method has apparently added some instability to the pricing of street lights. The cost of power was quoted as 4.5¢/kWH.

APS does marginal cost studies but does not rely heavily on them. APS now owns approximately 55,000 street lights, with an additional 5% owned by the cities.

A presentation with handouts was given to describe the impact of the first three steps of the APS rate case filed October 3, 1983. That will not be reviewed here as a subsequent filing made on December 9, 1983, replaced the October 3rd filing. It clarified, however, that although the street lighting class was underearning (paying less than its share compared to other classes), that class will not see increases as large as the others (such as residential, commercial, etc.). This is because of the cost increases that are caused by the high cost of new generating plants which are not a large component of the total cost of street lighting.

Incandescent Street Lights

APS has numerous incandescent street lights (in older areas) which were "frozen" in 1978. This means that no new incandescent lights are being installed and further that at each rate increase the incandescent group gets a 5% increase over and above that the other lights receive. The purpose of this is apparently to discourage their continued use. (Most cities have contracts with APS that allow the cities to switch to more modern lights and fixtures after 20 years.)

Mercury Vapor

APS related that cities have almost no interest in installation of new mercury vapor lights.

Low Pressure Sodium

APS does not consider low pressure sodium a cost effective source of light. It is difficult to control, introduces inventory problems, and the sodium from burned out lamps is difficult to dispose of.

Shielding

Scottsdale and Flagstaff have been using shielded fixtures for some time. The pricing for the fixtures with shielding is the same even though the cost is "slightly higher".

UTILITY RATE PRESENTATION - SULPHUR SPRINGS VALLEY ELECTRIC CO-OP

SSVEC is a small utility located in Cochise County and regulated by the Arizona Corporation Commission. Cochise County adopted the Kitt Peak Ordinance last year giving them an incentive for SSVEC to make some changes in its lighting rates.

The utility has frozen the mercury vapor rate and now installs only high pressure sodium lights for street lighting. As ordinary replacement of incandescent and mercury vapor are required, they will be replaced with high pressure sodium.

Generally, the prices for high pressure sodium are lower than the prices for comparable mercury vapor lights.

Shielding

The costs of shielding adds \$12 to the total cost for a typical fixture cost of \$140 or an 8% increase.

Low pressure Sodium

The incentive to try low pressure sodium lighting came both from the lower energy use and the fact that it is the preferred source under the Kitt Peak Ordinance.

A test was made utilizing a 35 watt low pressure sodium source for security lighting. The following problems were revealed by the study -- almost all were anticipated and will be typically encountered by a utility electing to add low pressure sodium.

1. High cost of the 35 watt lamp--\$42.
2. Fixtures cost more.
3. Shorter life than mercury vapor.
4. Cost of warehousing an additional item.
5. Fixture may be heavier and require a longer arm which may require a stronger pole.

SSVEC believes there are applications for low pressure sodium and plans to use them in the future.

CHAPTER IV

ANALYSIS OF STREET LIGHTING RATES

Electric utility rates are based on the cost of providing a service, usually electric energy. In the case of street lighting, most of the costs are traceable to the investment in the street light lamp, fixture, and pole.

Tax Free Bonding

The cost of money is very different for a non-profit entity than it is for a stock company such as APS. SRP can borrow money through tax free bonds (much the same as the cities do) for 10% interest or less. APS' cost of a combination of bonds (taxed) and stock (partially taxed) is at least 50% higher. This translates to an annual interest rate of at least 15%.

Price Differential

Since approximately half of the cost of street lighting is related to capital costs (the cost of borrowing and keeping money), we would expect the APS rates to be 25% higher than SRP. However, the present rate and difference does not appear to be this great. There are two possible reasons for this:

1. Different approaches to cost allocation and rate design.
2. The fact that APS has been thwarted in its latest attempts to obtain rate relief.

Marginal Pricing

Cost of service studies are the universal basis upon which costs are allocated to a customer class (such as street lighting). Once completed, they are used to design individual rates. Cost of service studies are generally of two types, average cost and marginal cost.

Until the passage in 1978 of the Public Utility Regulatory Policies Act (PURPA), almost all studies were based on average costs. But PURPA, as one part of the National Energy Act, required for the first time that utilities also perform marginal cost studies.

SRP appears to be relying on its marginal cost studies to a greater extent than APS. Graph #1 shows SRP raising the cost of mercury vapor lights more rapidly than the high pressure sodium lights.

APS Rate Forecast

APS, as part of their current rate increase request filed on December 9, 1983, forecasted rate increases keyed to certain dates with regard to Palo Verde construction and start-up. These dates have been moved back due to problems related

to the plant startup. However, we have included them as originally filed to indicate the company's most recent formal position on rate levels for high pressure sodium and mercury vapor lights.

Since the last APS rate design case went into effect during the third quarter of 1983, there has been a significant shift in cost responsibility between high pressure sodium and mercury vapor. The monthly cost of the 30,000 lumen high pressure sodium decreased in price from \$13.54 to \$11.53. This 15% decrease is then followed by a projected increase of 35% over a period of less than one year. This would appear to bring it back to a point where no decrease had occurred at all (see graph #1).

The APS projected increases for service to lights owned by others shows a significant decrease for high pressure sodium lights that was to go into effect on April 1, 1984 (see graph #2).

The cause of these dramatic changes are not fully understood. The following factors could be influential:

1. The new direction given by the ACC in order #53615 which was expected to raise the cost of all lights.
2. Forecasted changes in the price of high pressure sodium fixtures and lamps. (Marginal Pricing Changes).
3. Other outside influences.
4. A combination of events.

Under the category of outside influences would be the fact that the City of Phoenix (and several other cities) are considering the possible purchase of street lights now owned by APS and SRP. A report performed by Price Waterhouse and dated November 30, 1983, recommends that Phoenix purchase a total of 40,200 street lights from both utilities.

Rate Levels Unchallenged

The APS and SRP rates for individual street lights have not (to our knowledge) recently been challenged in a rate case. Other rate designs, such as the residential and commercial, are challenged and argued in almost every case.

Frozen Rates

At present, the APS incandescent rates are frozen (defined on page 7). This acts as an incentive to convert to other forms of lighting that are more energy efficient; but since these other forms of light cost more to install, the price burden may move from the utility that converts to high pressure sodium to the utility that continues to use the older incandescent fixtures.

The subsidy that existed because the incandescent lights were bringing in more than they cost (due to the 5% increases) would be gone and would have to be made up from the rates for other lighting types in the next rate case.

Investment by Others

In some cities, the developers pay for and install street lights in new developments. The cities are then charged by the utility only for the maintenance and power.

In some situations, the title to the light actually resides with the utility. If the city later decides to purchase the light, problems may arise because the city is required to compensate the utility for its lost revenue.

New SRP Rate

On January 1, 1984, Salt River Project introduced a rate that is similar to the APS rate where the investment is provided by others. Up until that date, the Project had offered only a lamp and power service.

The effect of this new rate is that after a contribution (equal to the total cost of the installation of the pole, fixture, and luminaire), the SRP will own, maintain, and operate the light as if it were its own.

Power Only Rate

Neither utility offers a rate for street light energy alone. Generally, they do offer metered energy on their regular general service rates but this is unattractive.

Although not acceptable, the SRP time-of-day rate (E-32) does offer the lowest price for power only.

CHAPTER V

THE KITT PEAK ORDINANCE - UTILITY RATE INTERPLAY

Utility rates change in response to a number of factors, most of which are directly tied to the regulators' perceptions of the present and future costs that the rates are to recover. The ordinance could influence street lighting prices in the following ways:

Mercury Vapor

If new mercury vapor lights are prohibited (as required by the ordinance) their numbers will gradually decrease due to conversions to high pressure sodium, street widening and other changes. Lamps that are knocked down would have to be fully shielded before replacement. This assumes that it would be unacceptable to have a high pressure sodium on a street of all mercury vapor.

Although we have been unable to fully assess this impact, we believe that the ordinance will not have a significant impact on rates for mercury vapor lights.

Of much greater impact would be a move to freeze mercury vapor lamps. This would place a heavy burden on most cities as these lights are the most numerous type.

Low Pressure Sodium

Although the ordinance places low pressure sodium in the position of being the preferred light source, the utilities do not offer a low pressure sodium rate. We see no inclination by utilities in the Phoenix area to voluntarily implement such a rate.

Shielding

The cost of installing fully shielded high pressure sodium lamps is 3 to 10% greater than that of non-shielded fixtures, but the same rate is charged for both. Therefore, all high pressure sodium users pay for the shielding. The result is that if a city continues to install new unshielded high pressure sodium lights it will pay the same monthly charge as a city that installs only fully shielded fixtures in conformance with the ordinance.

Limited Information

In order for the cities to make wise decisions regarding the ordinance they need good cost information. Unfortunately, this is occurring at the same time that the two primary sources of information (APS and SRP) are beginning to negotiate with the City of Phoenix for the purchase of their street light systems.

The utilities are viewing most requests for information and cost data as influencing the negotiations. As a result, it is difficult to get answers that aren't biased by these negotiations.

CHAPTER VI

PROBLEM AREAS AND POTENTIAL ANSWERS

Most of the problem areas that have been addressed are such because they are impacted by the proposed ordinance. Other problem areas are related to the regulated monopolistic nature of the utilities.

The ordinance implementation movement raises some questions about the pricing of utility services. These questions may have to be answered in formal regulatory hearings.

A third and possibly more important factor is that certain cities (particularly Phoenix) are considering purchasing their street light systems.

All of these factors influence each other to a greater and lesser extent. We will now summarize the major problems that our analysis has revealed.

Problem (APS & SRP) No low pressure sodium street light rate.

Solution If the cities would like the utilities to implement a low pressure sodium rate, the best approach would be to approach their regulators in a formal rate case.

Caution: The apparent utility dislike for low pressure sodium may result in a high price.

Another solution for those cities considering purchasing the system is to install their own low pressure sodium street light system.

Problem The requirement that prohibits installation of new mercury vapor (APS & SRP) lights could lead to this rate being frozen, resulting in a higher rate escalation than the other lights.

Although the possibility of this occurring appears low, the resulting lighting expense would be great.

Solution The relationship of the mercury vapor to the other classes should be monitored.

Problem All existing incandescent lights are frozen. They are no longer cost effective because they are an inefficient light source and their price has been escalated.

Solution

1. If the lights have been in place for twenty years, request a no cost change to high pressure sodium.
2. Challenge in a formal rate hearing the 5% excess price increases.

Problem The APS stepped rate increase (a series of future increases) indicates some surprising changes in pricing, particularly with regard to the 20,000 lumen mercury vapor and the 30,000 lumen high pressure sodium.

Solution Request an explanation of this change in pricing. If it's still a problem, measure its economic impact and intervene in the upcoming APS rate case.

Problem
(APS & SRP) There is not an attractive rate for street light power only. This is needed in order to be able to obtain competitive bids on street light maintenance.

Solution Attempts to negotiate for a new street light power rate are not recommended unless as part of the overall plan for street light acquisition. An important asset in these negotiations might be the formation within the city of a utility department to purchase power at wholesale for street light use.

Problem
(APS & SRP) Cost and price information is both limited in amount and biased by the street light system purchase negotiations that are just beginning.

Solution A clearing house for information could be set up (within MAG possibly) to help satisfy the need for objective information.

Problem High price of street lighting service, coupled with a belief that the city can provide the service at a lower cost. Leading to a decision to purchase the street light system.

Solution These negotiations must be hard fought if the cities expect a fair price. The negotiations will begin with the utility, then move on to the regulator and ultimately end up in the courts.

* * * * *

SELECTED STREET LIGHT COMPARISON

Arizona Public Service

Lumens	Type	Watts	1-10-79		6-1-80		11-1-81		12-2-82		11-1-83		2-1-84		Proposed			
			C O		C O		C O		C O		C O		C O		1-1-84 I		6-1-84 III	
			C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
7,000	MV	175	4.73	2.85	5.11	3.11	6.52	4.00	6.79	4.27	7.01	4.40	7.52	4.72	7.79	4.46	8.47	4.85
9,500	HPS	100	6.68	3.95	7.16	4.25	9.07	5.40	9.23	5.56	9.53	5.74	10.23	6.16	9.69	3.49	10.53	3.75
20,000	MV	400	7.56	4.83	8.22	5.31	10.53	6.87	11.13	7.47	11.48	7.68	12.32	8.24	15.90	8.66	17.29	9.41
30,000	HPS	250	9.63	5.76	10.37	6.35	13.18	7.99	13.59	8.40	11.53	8.66	12.37	9.29	14.39	6.65	15.60	7.23

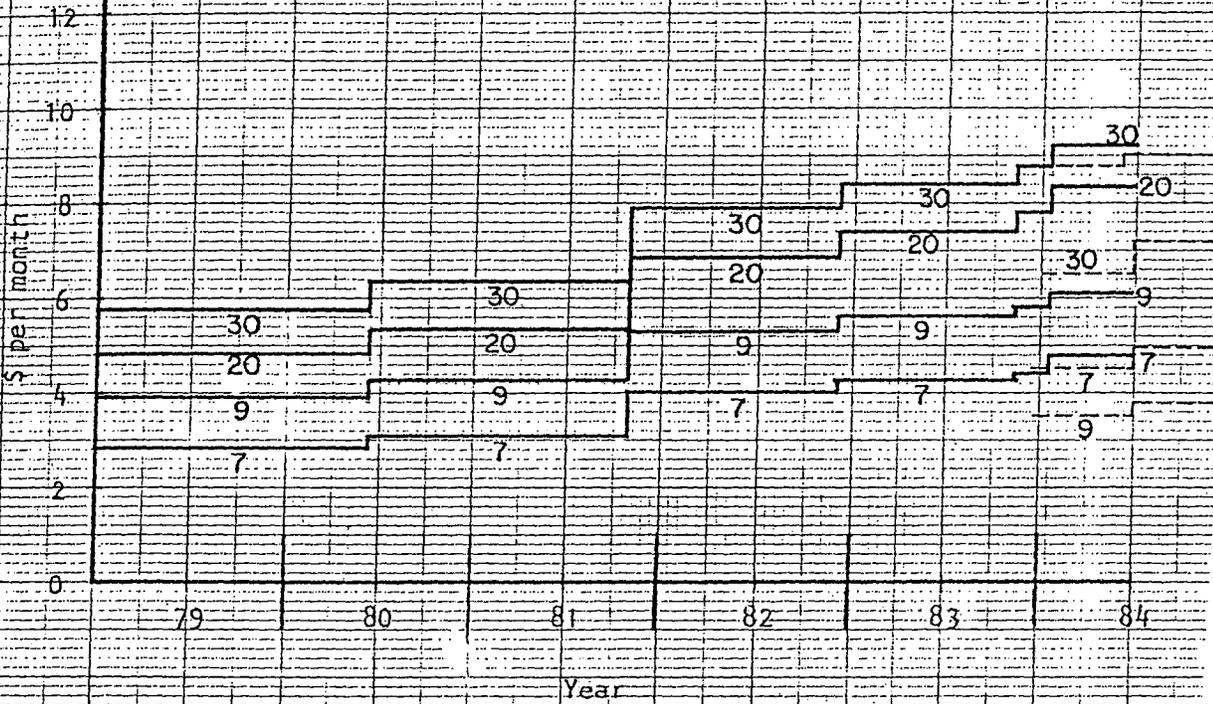
Salt River Project

			1-4-79		3-1-80		4-1-81		4-1-83		New Rate
			C L		C L		C L		C L		1-1-84
			C	L	C	L	C	L	C	L	O
7,000	MV	175	4.75		4.97		6.02	3.84	6.55	3.84	5.61
9,500	HPS	100	5.33		5.75		6.65	4.29	6.91	4.29	5.03
20,000	MV	400	6.79	4.69	7.60	5.25	9.44	6.79	10.13	6.93	9.56
30,000	HPS	250	7.61	4.84	8.26	5.26	9.90	6.44	10.28	6.62	8.09

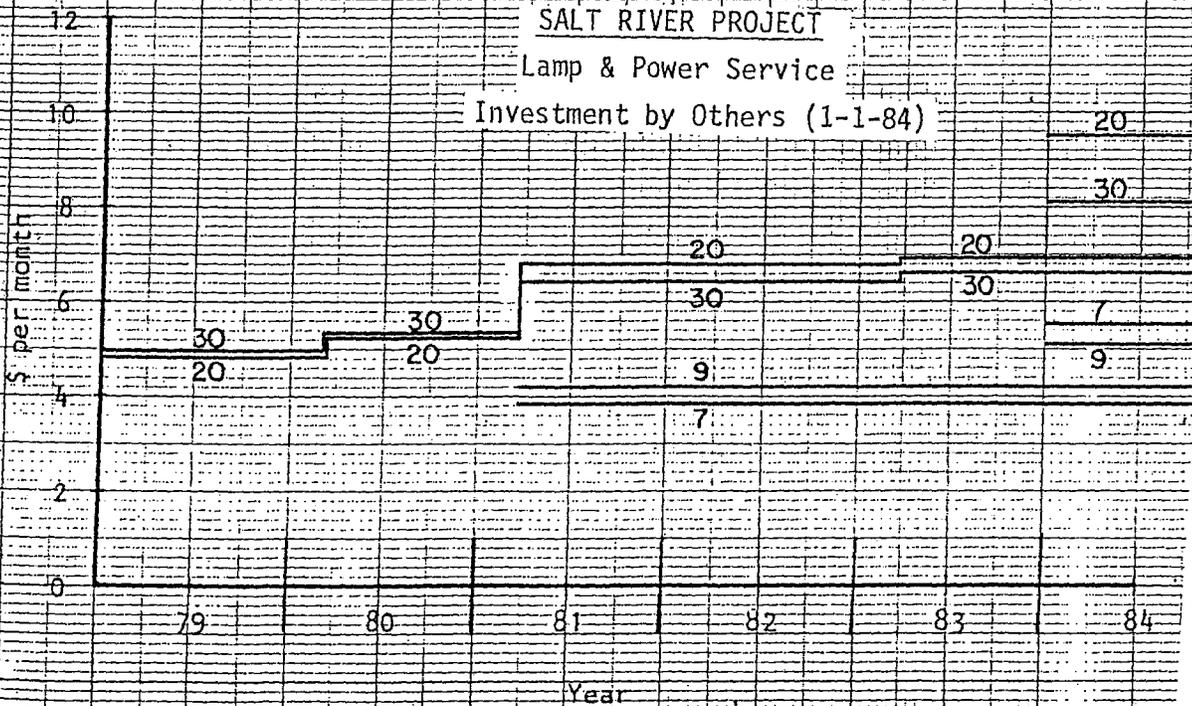
C - Company Owned
 O - Investment by Others
 L - Lamp and Power Service

UTILITY STREET LIGHT PRICE CHANGES FOR INVESTMENT BY OTHERS

ARIZONA PUBLIC SERVICE Investment by Others

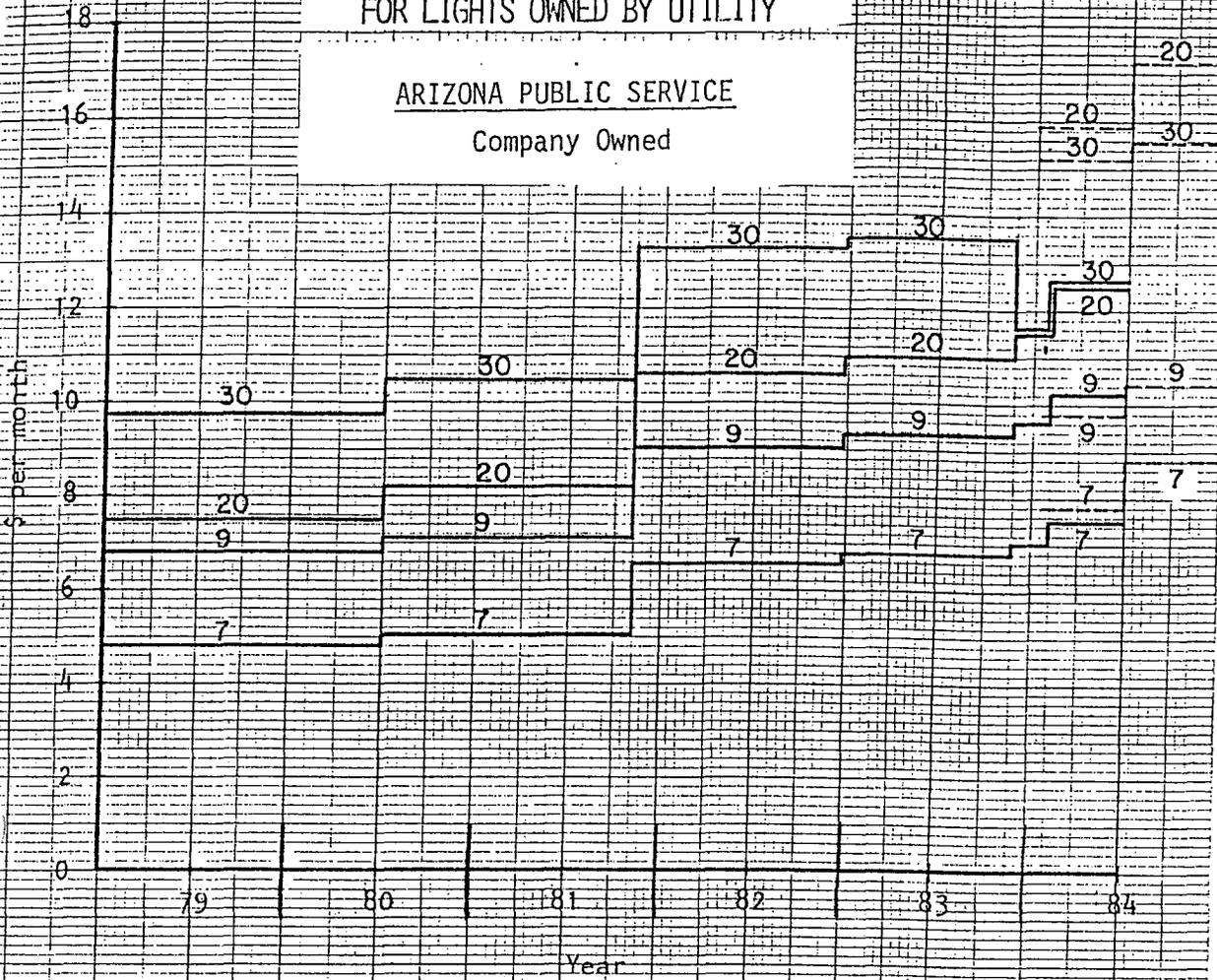


SALT RIVER PROJECT Lamp & Power Service Investment by Others (1-1-84)

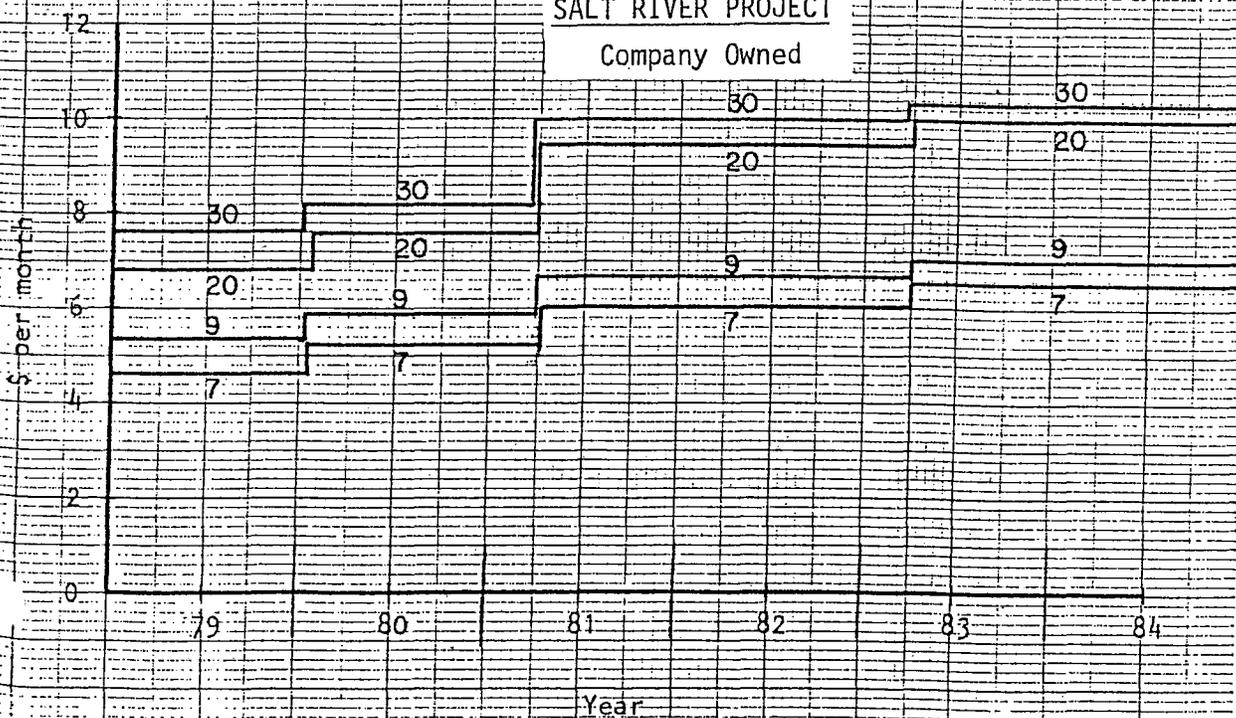


UTILITY STREET LIGHT PRICE CHANGES FOR LIGHTS OWNED BY UTILITY

ARIZONA PUBLIC SERVICE Company Owned



SALT RIVER PROJECT Company Owned



APPENDIX A

INTERIM
ELECTRIC RATES

E-58

ARIZONA PUBLIC SERVICE COMPANY
Phoenix, Arizona
Filed by: B. Paul Hart
Title: Vice President, Rates and Regulation
Date Original Filing: February 21, 1952
District: Company's Rate Areas
1, 2 & 4

A.C.C. No. 4031
Cancelling A.C.C. No. 3930
Tariff or Schedule No. E-58
Twenty-sixth Revised Sheet No. 1
Effective: February 1, 1984
Filed: January 30, 1984

STREET LIGHTING SERVICE

AVAILABILITY

In those portions of cities, towns and unincorporated communities in which Company does a general retail electric business and where Company has installed a multiple or series street lighting system of adequate capacity for the service to be rendered.

APPLICATION

To service for lighting public streets, alleys, thoroughfares, public parks and playgrounds by use of Company's facilities where such service for the whole area is contracted for from Company by the city, town, other governmental entities, or a responsible person for unincorporated communities.

Service is from dusk to dawn and Company will own (except as provided below), operate, and maintain the street lighting system including lamps and glass replacements.

The Incandescent Lamp, Standards and Underground Circuits Charges (Part II, A, B & C of this rate schedule) are applicable and available only to those customers being served and those installations in service on October 1, 1978.

MONTHLY BILL

RATE

I. Non-Incandescent Lighting

A. Lamp, Luminaire & Bracket Charge (Lumens and wattages are nominal initial ratings)

	Investment Cost Provided By	
	Company	Others
5,800 lumens, 70 watts, hi-pressure sodium	\$ 9.09	\$ 5.86
7,000 lumens, 175 watts, mercury vapor	7.52	4.72
9,500 lumens, 100 watts, hi-pressure sodium	10.23	6.16
11,000 lumens, 250 watts, mercury vapor	10.57	6.64
16,000 lumens, 150 watts, hi-pressure sodium	11.20	6.91
20,000 lumens, 400 watts, mercury vapor	12.32	8.24
30,000 lumens, 250 watts, hi-pressure sodium	12.37	9.29
32,000 lumens, 400 watts, metal halide	16.39	11.71
50,000 lumens, 400 watts, hi-pressure sodium	16.41	10.59

B. Pole Charge

Type	Description	Investment Cost Provided By	
		Company	Others
1.	An existing distribution pole suitable for street light use.	\$ 0.91	\$ 0.00
2.	A wood pole for street lighting only for light center mounting heights of 35 feet or less.	\$ 5.05	\$ 1.87
3.	A metal pole for light center mounting heights of 28 feet or less.	\$ 6.93	\$ 2.46
4.	A metal pole for light center mounting heights between 29 feet and 40 feet.	\$ 8.55	\$ 3.37
5.	An anchor base used with Pole Types 3 or 4.	\$ 3.62	\$ 0.00

C. Monthly Charges as Required Under "Special Provisions."

(Continued on Reverse Side)

II. Incandescent Lighting

A. Lamps	2,500 lumen incandescent	\$ 4.16
	4,000 " "	5.86
	6,000 " "	7.95
	10,000 " "	12.64

B. Standards
(See "Special Provisions")

	Investment Cost Provided By	
	Company	Others
Type A	\$12.28	\$4.57
Type B	8.90	3.75
Type C	5.00	2.58
Type D	3.42	2.12
Type E	4.57	2.12
Type F	2.87	----
Type M	7.16	3.57
Type N	5.00	----
Type P	9.26	5.71

C. Underground Circuits		
Per foot of cable, installed under paving	\$ 0.0878	\$0.000
Per foot of cable, not installed under paving	\$ 0.0313	\$0.000

MINIMUM \$50.47

ADJUSTMENTS (1) Subject to a purchased power and fuel (PPF) unit cost adjustment of plus or minus .0001¢/kwh for each .0001¢/kwh by which the PPF unit cost to the Company's electric operations exceeds or is less than 1.5135¢/kwh. The method of application is set forth in the filed "Plan for Administration of Adjustment for Purchased Power and Fuel Cost."

(2) Plus the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of gross revenues of the Company and/or the price or revenue from the electric energy or service sold and/or the volume of energy generated or purchased for sale and/or sold hereunder.

SPECIAL PROVISIONS

Facilities and Service

Street lighting facilities installed under this rate are of the type currently being furnished by Company as standard at the time service is initially requested. Company will maintain current street lighting construction standards and endeavor to keep abreast of all modern methods and practices.

The Company will use diligence in maintaining service. Monthly bills will not be reduced on account of lamp outages.

Presently installed units which do not conform to the above types will be billed in accordance with the type which is most nearly like such units.

Special Facilities

When Customer requests special (non-standard) street lighting facilities not provided by Company as standard, Company will use its best efforts to install, operate and maintain such facilities.

If the Company installs such special facilities, there will be an additional charge equal to 1-1/2 percent per month of the excess cost to the Company over standard facilities at time of installation and the maintenance of such facilities will be subject to time and ability to purchase replacement parts at reasonably equivalent prices of standard equipment. When the Company is currently using more than one standard for a particular type of installation, the excess cost to the Company shall be determined from the standard equipment with the highest cost within the range of standards for that particular type of installation.

The Customer may elect to substitute a one-time contribution in aid of construction equal to the excess costs in lieu of the additional charge.

The Company may decline to continue maintenance of special facilities due to inability to purchase replacement parts at reasonably equivalent prices of standard equipment. In this event, the Customer may elect to supply the required parts at no cost to the Company and the Company will then continue to maintain such facilities.

Extension of Street Lighting System

The Company will extend its standard street lighting system up to a distance of 300 feet for each additional lighting installation at the request of the customer. When the extension is underground the Customer will provide the trench and backfill or conduit space. The Company will provide the trench and backfill or conduit space at Customer's request for an additional monthly charge of 1-1/2 percent of its cost, or at option of Customer, a contribution in aid of construction equal to the cost of trench and backfill or conduit space.

Additions to the street lighting system which are over 300 feet per installation or are of a non-standard nature not normally provided by the Company can be installed when the total cost to the Company of the installation does not exceed 6-1/2 times the annual revenue including the underground and/or special facilities charge. When the total cost to the Company of the installation does exceed 6-1/2 times the annual revenue, a monthly charge of 1-1/2 percent of the excess cost will be added to the billing in addition to any required special facilities charge and/or underground charge. Customer may elect to pay a contribution in aid of construction equal to such excess cost in lieu of the monthly charge of 1-1/2 percent.

Extensions to isolated areas requiring a substantial extension of the electric distribution system, as opposed to extension of the street lighting system, will require a special study to determine the conditions on which the Company will make such extension.

Investment Cost Provided By - Others

If the Customer elects to be billed under the column headed "Investment Cost Provided By - Others", it must install the system at its own expense in accordance with the Company's specifications, or make a non-refundable advance to cover the Company's cost of installing the system. The Company will maintain and operate the system.

The Company's Incandescent Street Light Standards Are As Follows:

- Type A - Enclosed glass luminaire with 8-foot or less up-sweep bracket mounted on 35-foot anchor base monotube or fluted steel pole.
- Type B - Enclosed glass luminaire with 8-foot or less up-sweep bracket mounted on 35-foot embedded base metal pole.*
- Type C - Enclosed glass luminaire with 14-foot or less bracket mounted on wood pole carrying only street lighting equipment.
- Type D - Enclosed glass luminaire with 14-foot or less bracket mounted on wood pole carrying distribution circuits, or on other type pole paid for under another standard charge.
- Type E - Open type unit with 4-foot bracket mounted on wood pole carrying only street lighting equipment.
- Type F - Open type unit with 4-foot bracket mounted on wood pole carrying distribution circuits.
- Type M - Enclosed glass luminaire with 6-foot or less up-sweep bracket mounted on 30-foot embedded base metal pole.*
- Type N - Identical to Type M except customer makes a contribution of \$50 per light.
- Type P - Incandescent pole top luminaire mounted on 23-foot steel pipe pole.

CONTRACT PERIOD

Ten (10) years or more, at option of Company.

TERMS AND CONDITIONS

Subject to the Company's Terms and Conditions for the sale of electric service.

*Steel pipe or tubular steel at Company's option.

SALT RIVER PROJECT AGRICULTURAL IMPROVEMENT AND POWER DISTRICT

E-50

STANDARD ELECTRIC RATE SCHEDULE FOR STREET LIGHTING SERVICE

Effective: April 1, 1983
 Supersedes: April 1, 1981 E-50 and E-51
 Rate Schedules

APPLICABILITY:

To lighting public and common streets, parking lots, drives and alleys, thoroughfares, parks, playgrounds, and walkways for which such service is contracted under this rate schedule.

CHARACTER OF SERVICE:

A standard high pressure sodium (HPS) lamp or mercury vapor (MV) lamp, pole-mounted in an appropriate luminaire and controlled by a photo-electric switch.

MONTHLY RATE:

A. Basic charges (Lamp, Luminaire, Bracket, and Energy)

-----Style-----

<u>Lumens</u>	<u>Watts</u>	<u>Type</u>	<u>Early American</u>	<u>Streamlined</u>	<u>Modern</u>
5,800	70	HPS	\$ 6.39	----	\$----
7,000	175	MV	----	\$ 6.55	----
9,500	100	HPS	6.91*	6.91	10.86
11,000	250	MV	----	7.49	----
16,000	150	HPS	----	7.70	11.86
20,000	400	MV	----	10.13	----
30,000	250	HPS	----	10.28	15.91
50,000	400	HPS	----	12.27	18.04

Additions to basic charges when facilities are provided and owned by District.

Poles

- | | |
|---------------------------|------------|
| 1. Suitable existing pole | No charge |
| 2. 14' steel | \$2.66/mo. |
| 3. 17'6" and 23'6" steel | \$3.56/mo. |
| 4. 26'6" and 31' steel | \$4.91/mo. |
| 5. 35' steel | \$6.52/mo. |

*Also available in a contemporary style at the same rate.

B. Lamp and Power Service

For power and lamp service when facilities are installed and owned by the customer (subject to District approval of such installation and equipment):

<u>Lumens</u>	<u>Watts</u>	<u>Type</u>	<u>Monthly Charge</u>
5,800	70	HPS	\$3.60
7,000	175	MV	3.84
9,500	100	HPS	4.29
11,000	250	MV	4.99
16,000	150	HPS	4.87
20,000	400	MV	6.93
30,000	250	HPS	6.62
50,000	400	HPS	7.69

ADJUSTMENTS:

- A. The rate is subject to an increase or decrease based on changes in the weighted average cost of fuel and purchased power. Excluded from the average cost are the demand portion of firm purchases and certain other fixed or otherwise predictable, recurring expenses predominantly associated with fuel handling. The fuel adjustment is calculated prior to each winter and summer season (and at any other time when necessary) by dividing the estimated average cost of fuel and purchased power, plus any variance between estimated and actual cost of fuel carried forward from the preceding adjustment period, by the applicable kilowatt-hours.
- B. The monthly rate is increased for the proportionate part of any taxes or governmental impositions which are assessed on the basis of gross revenues of the District, and/or the price or revenue from the electric energy or service sold, and/or the volume of energy generated or purchased.

TERMS OF PAYMENT:

All bills are due when rendered and are delinquent 15 days thereafter.

RULES AND REGULATIONS:

This schedule is subject to the Rules and Regulations of the District governing electric service, including amendments thereto.

CONDITIONS:

- A. Monthly bills will not be reduced because of lamp outages or temporary turnoffs requested by the customer. The customer must notify the District when lamp outages occur.

- B. A customer shall pay for the cost of additions to the street lighting system by a non-refundable contribution in aid of construction. When the contribution for the addition is to District-owned facilities, the District may adjust the rate to recognize the contribution.
- C. The District will not extend its street lighting system more than 300 feet for each light installation.
- D. Lighting units are available at any point where the District, in its judgment, has existing facilities of adequate capacity; however, no units will be installed on transformer poles or similar pole structures if such installation conflicts with the National Electric Safety Code or local regulations governing electric service and installations.
- E. The point of delivery is at the base of the pole for underground installations and at the overhead attachment point when lines are run overhead.
- F. A customer may not make connections, attachments, or alterations to the electric lighting circuits or to the lighting equipment without the District's consent.
- G. A customer will bear the cost of relocating a District-owned private street lighting installation unless such relocation is made for the convenience of the District.
- H. Units for which no basic charge has been included in this schedule will be billed at a charge determined by District management, subject to ratification or retroactive adjustment by the District Board of Directors within one year from the date of initiation of the charge.
- I. Additions to or conditions relating to the street lighting system other than those contained herein will be by supplementary agreement between the customer and the District.

SALT RIVER PROJECT AGRICULTURAL
IMPROVEMENT AND POWER DISTRICT

Standard Electric Rate Schedule for Street Lighting Service - Addendum to E-50

Effective: January 1, 1984

Monthly Rate:

C1 - I.P.B.O. (Investment provided by others)

Basic Charges (Lamp, Luminaire, Bracket and Energy)

<u>Lumens</u>	<u>Watts</u>	<u>Type</u>	<u>Monthly Charge</u>
5800	70	H.P.S.	\$4.75
7000	175	M.V.	5.61
9500	100	H.P.S.	5.03
11000	250	M.V.	6.49
16000	150	H.P.S.	5.89
20000	400	M.V.	9.56
30000	250	H.P.S.	8.09
50000	400	H.P.S.	9.50

Additions to the Basic Charges when facilities are provided with I.P.B.O.

<u>Poles</u>	<u>Monthly Charge</u>
1. Suitable Existing Pole	Not Applicable
2. 14' Steel	\$1.33
3. 17'-6" and 23'-6" Steel	1.78
4. 26'-6" and 31' Steel	2.46
5. 35' Steel	3.26

<u>Underground Extensions*</u>	<u>One-Time Charge**</u> OR	<u>Monthly Charge</u>
a) Trenching and Backfill Provided by the Power District	\$2.08/ft	\$1.43/100 ft
b) Trenching and Backfill Provided by the Customer	0.43/ft	0.30/100 ft

*This section subject to Provision J in the Condition Section of of this Rate Schedule.

**Subject to Annual Review