

ATTACHMENT 1 PVID's MRP

Palo Verde Water Quality Monitoring Plan



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**Prepared For:
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August 2005**

**Revised by Palo Verde Irrigation District
August 8, 2012**

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1.0 Background

This Monitoring Plan is being prepared for the Palo Verde Irrigation District (PVID) to assist in complying with the State's Non-point Source Pollution Control Program. The monitoring requirements incorporated within this document will be used by the PVID as part of the Conditional Waiver Option of the Non-point Source Pollution Control Program.

2.0 Purpose

All current and proposed Non-point source discharges must be regulated under Waste Discharge Requirements (WDRs), waivers of WDRs, a basin plan prohibition, or some combination of these tools administered by the Regional Water Quality Control Board (RWQCB). The recommendations set forth in this monitoring plan are intended to aid PVID in monitoring the water quality from non-point source agricultural discharges within its region and address measures that dischargers should take to stay in compliance with the proposed Conditional Waiver. This monitoring plan is intended to show that non-point source discharges from irrigation and agricultural fields meet the water quality objectives of the Basin Plan and will not impact the beneficial uses of the Colorado River.

3.0 Monitoring Plan

The Palo Verde Irrigation District is a privately developed district formed by the California legislature in 1923 located in Riverside and Imperial Counties, California. Water for irrigation is diverted from the Colorado River at the Palo Verde Diversion Dam and is conveyed through 244 miles of main canals and laterals to serve approximately 93,500 acres of cultivated land. The irrigation return flows are collected in a 142 mile drainage system (Table 1) and returned to the Colorado River. This Monitoring Plan addresses recommended sampling locations, constituents to be analyzed, when to sample, sampling procedures and analysis, training of personnel, water quality objectives for the constituents analyzed, what to do if a water quality objective is exceeded, implementing best management practices, and compliance with the RWQCB. Also included in this Monitoring Plan is a cost estimate to sample the drains, Table 3.

3.1 Monitoring Sites

Sampling should be performed at discharge locations which are representative of PVID's contribution to the greater watershed. PVID has designated the following four locations as representative of the Palo Verde Valley region as shown in Figure 1:

- ◆ Monitoring Site # 1 is taken in the Colorado River at the Palo Verde Diversion Dam. This sample is used as an upstream control for comparison with the other three monitoring sites.
- ◆ Monitoring Site # 2 is upstream of the siphon where the Eastside Drain crosses Lovekin Blvd.

- ◆ Monitoring Site # 3 is in Outfall Drain between 35th Avenue and the County line.
- ◆ Monitoring Site # 4 is at the Outfall Drain metering station 148+00 about .8 miles above the Township line which is the southern boundary line for PVID.

These 4 sites will provide water quality information on the various drain maintenance activities performed monthly in the Outfall Drain System. By comparing the various upstream sample constituent information at Site #1 with the downstream sample information for Sites #2, 3, or 4, maintenance impacts for various time periods can be evaluated for the different stretches of drainage areas. Also, for the Outfall Drain, by comparing the upstream Site #2 with the downstream Site #3 and by comparing the upstream Site #3 with the downstream Site #4, maintenance impacts for various time periods can be evaluated for the different stretches of the Outfall System. The important comparison is the upstream Site #1 with the downstream Site #4 to determine the magnitude of constituents from drain maintenance activities that are actually being returned to the Colorado River.

Samples are taken within the actual flow area of the water. In general, avoid sampling from ponded, sluggish, or stagnant water. Note that samples taken downstream of a bridge could be contaminated from the bridge structure or runoff from the road surface. The sampling locations are shown on the Palo Verde Irrigation District Drain Map as Figure 1.

3.2 Analytical Constituents

The major pollutants of concern within the Palo Verde Region are from irrigation discharges and include nutrients, pesticides, salts and sediments. Based on these pollutants, sampling at each location is recommended for:

- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ pH ▪ Temperature ▪ Nitrates (NO₃) ▪ Total Dissolved Solids ▪ Total Suspended Solids ▪ Conductance ▪ Total Phosphorus ▪ BOD₅ | <ul style="list-style-type: none"> ▪ Chlorpyrifos (OP ⁽¹⁾ Insecticide) ▪ Malathion (OP Insecticide) ▪ Dimethoate (OP Insecticide) ▪ DDT (CH ⁽²⁾ Insecticide) ▪ Endosulfan (CH ⁽²⁾ Insecticide) |
|--|--|

(1) Organophosphate EPA Method 8141

(2) Chlorinated Hydrocarbon EPA Method 8081

3.3 When to Sample

During the first year of the monitoring program, monthly sampling for all of the listed pollutants, except the pesticide/insecticide pollutants, is recommended at the specified sampling locations. The pesticide/insecticide pollutants listed above shall be sampled quarterly at the specified sampling locations. Avoid sampling the drain while non routine events are occurring that would misrepresent the drain water quality, i.e. storm runoff from the desert is visibly changing the drain water color. If the sample results do not indicate any problem areas or concerns within the first year, then sampling would be proposed to be revised to a quarterly or semi-annual basis subject to Regional Board approval, otherwise continue on the initial sampling schedule. Samples shall be collected from safely accessible locations. Safety of personnel shall be of primary concern.

3.4 Trained Personnel for Sampling

Only personnel trained in water quality sampling procedures should collect the samples. Many of the laboratories and consultants have staff that are trained and can perform this task. Another option would be to find a training course to train personnel from PVID's staff. Sampling personnel should be identified prior to starting the Monitoring Program and trained to clearly understand the sampling procedures.

3.5 Sampling Procedures

The collection and handling of samples requires care to ensure the integrity and validity of the samples. A Chain of Custody (COC) Form must follow the sample through the analysis process. A copy of this form may be obtained from the lab. Additional documentation to track other information, such as field conditions (i.e. temperature, pH), or field measurements may also be used. This information is recorded on a Field Tracking Form.

Before starting the sampling program, contact the analytical laboratory that will analyze the samples. Laboratory analyses must be conducted by a laboratory that is currently accredited by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP). The analytical laboratory will provide a sampling kit that contains the required sample bottles, chain of custody forms, and any other information needed.

Sampling personnel will collect manual grab samples. To collect the sample, place the sample container with open-end facing upstream directly into the stream of water. Be sure not to contaminate the inside of the container. Follow this procedure for each container in the kit. Once the samples are collected, sampling personnel will complete a Chain of Custody Form. The required information is: the names and signatures of the people handling the sample in the field, the date and time, and location of sample. Sampling personnel will deliver the samples to the laboratory. Due to the 48 hour holding time limit on Nitrates, the samples must be delivered promptly to the lab for satisfactory results. Some samples may need to be delivered on ice. This should be coordinated with the laboratory when setting up the sampling program.

3.6 Sampling Analysis

For accredited laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

3.7 Records and Maintenance

All laboratory analyses, field measurements, Chain of Custody Forms, and any other documentation related to this Monitoring Plan should be kept together in a 3-ring binder at PVID’s office. This information may be subject to review by the RWQCB if a problem occurs.

3.8 Water Quality Objectives

Currently, there are no numeric limits that have been set for agricultural activities within the Palo Verde Region. TMDLs (Total Maximum Daily Loads) are generally developed for water bodies that are impaired by pollutants and are set to protect the water quality of a specific water body. The Palo Verde Outfall Drain is impaired for pathogens and TMDLs are currently being developed by the RWQCB. The table below contains benchmark values derived from the Basin Plan as well as the U.S. EPA Multi-Sector Permit. These values have been provided only for guidance in assisting RWQCB in defining acceptable and obtainable limits for the non-point source discharge samples. Note that many of the insecticide constituents do not currently have water quality objectives that have been set by any governing agency. It is recommended that PVID coordinate with the Regional Water Quality Control Board to determine the acceptable levels for agricultural runoff. The Pesticides Database at <http://www.pesticideinfo.org/Index.html> also contains information on toxicity and regulatory information for pesticides and may be helpful in determining some limits for achieving proposed water quality goals.

Constituent	Water Quality Objectives	Reference
pH	6.0 – 9.0	Basin Plan
Nitrates (NO ₃)	10 mg/L (maximum)	Basin Plan
Total Phosphorus	See Note 1	Basin Plan WQO
Chlorpyrifos (insecticide)	.02 mg/L	Basin Plan WQO
Malathion (insecticide)	See Note 1	Basin Plan WQO
Dimethoate (insecticide)	See Note 1	Basin Plan WQO
DDT (insecticide)	1.1 mg/L	Basin Plan WQO
Endosulfan (insecticide)	See Note 1	Basin Plan WQO
Total Dissolved Solids (TDS)	2000 mg/L (annual avg), 2500 mg/L (max.)	Basin Plan
Total Suspended Solids (TSS)	See Note 1	Basin Plan WQO
Biological Oxygen Demand (BOD)	See Note 1	Basin Plan WQO

References: Water Quality Control Plan - Colorado River Basin Region 7 (Sept 2003)

Note 1: No individual chemical or combination of chemicals shall be present in concentrations that adversely affect beneficial uses.

4.0 What to do if a Water Quality Objective is Exceeded

If the sampling results show that a water quality objective has been exceeded (by a considerable amount), then PVID will inform the RWQCB. RWQCB should then make a reasonable effort to take the following steps as soon as possible:

- Identify the source of the problem
- Have the appropriate party repair or replace any Best Management Practices (BMPs) that have failed
- Have the appropriate party maintain any BMP that is not functioning properly due to lack of maintenance
- Have the appropriate party evaluate whether additional BMPs should be implemented

If the analysis during subsequent sampling events does not show improvements from the previous analysis, then additional BMPs should be implemented until the desired water quality objective is met or revised. The RWQCB is responsible for enforcing the water quality requirements while PVID educates the landowners about possible BMPs to minimize non-point source pollutant discharges. It is the landowners' responsibility to implement and maintain all BMPs. Section 5.0 discusses possible BMPs that can be used within agricultural regions.

5.0 Best Management Practices Implementation

The term Best Management Practices (BMPs) refers to specific control measures that are implemented by the Owner to effectively control and minimize the pollutant loadings in runoff and aid in achieving water quality objectives. The term BMP can also be used interchangeably with the term Management Measure (MM). Some of the BMPs that have been developed for agricultural regions, specifically relating to irrigation include:

- Erosion and Sediment Control
- Nutrient Management
- Pesticide Management
- Water Conservation
- Irrigation Water Management
- Education/Outreach

Some of the BMPs listed above for non-point discharge sources are included in Table 2 with descriptions. The Basin Plan also contains recommended BMPs for point discharge sources on-field and off-field sediment control (see page 4-31 of Basin Plan).

6.0 RWQCB Compliance

Typically, the RWQCBs have regulated individual point source dischargers, rather than groups of dischargers who are represented by or coordinated through third parties, such as the PVID. Individual non-point source dischargers, including both landowners and operators, continue to bear ultimate responsibility for complying with a RWQCB's water quality requirements and orders.

Generally, under the Porter-Cologne Act, the RWQCB cannot take enforcement actions directly against non-discharger third parties. Individual non-point source dischargers need to be informed as to what individual non-point source discharger actions or inactions will lead to individual enforcement. The most effective way to stay in compliance with Regional water quality standards is for individual owners to perform self-monitoring and to determine the effectiveness of their own management practices. PVID can assist in this effort by providing technical assistance, educational pamphlets/brochures/fact sheets, and other forms of education and outreach to the growers. If water quality objectives are being exceeded, the role of PVID should be to work with the individual (or group) who is in violation and determine the necessary BMPs that should be implemented to improve water quality. This may include evaluating BMPs that will treat or filter non-point source discharges coming off the land or changing a specific management practice (i.e. using different irrigation methods or use of less toxic fertilizers/insecticides).

Figure 1: Sampling Location Map

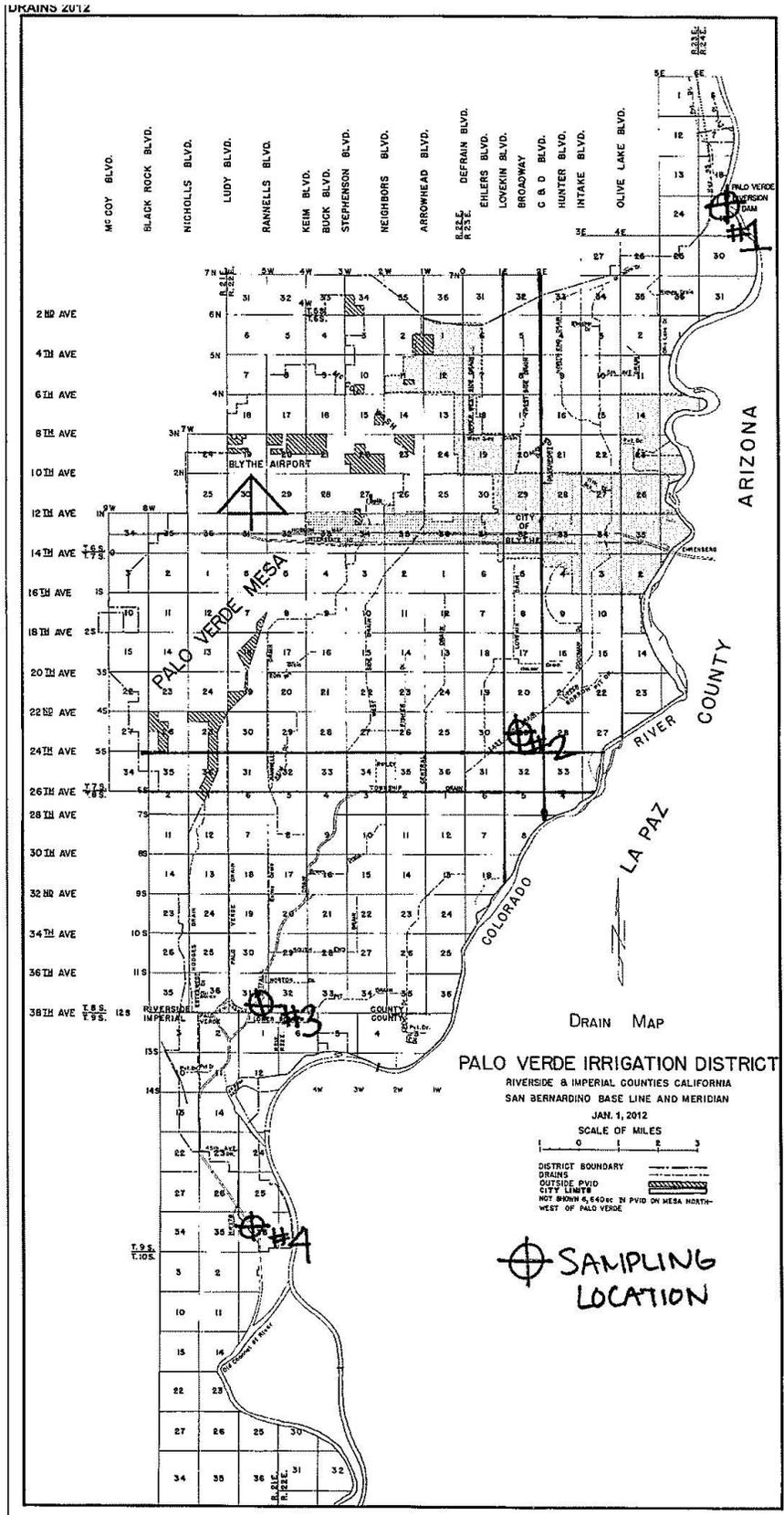


Table 1: PVID's Drain System		
DRAIN NAME	TOTAL LENGTH	
	FEET	MILES
ANDERSON DRAIN (pump)	1,760	0.33
BOLLENBACHER DRAIN	3,600	0.68
BROWN DRAIN	15,620	2.96
CENTRAL DRAIN	27,020	5.12
CREWS DRAIN	11,160	2.11
DAVENPORT DRAIN (pump)	6,098	1.15
EASTSIDE DRAIN	81,595	15.45
ELEVENTH AVE DRAIN	4,059	0.77
ESTES DRAIN	15,242	2.89
ESTES WEST DRAIN	5,994	1.14
FIFTH AVENUE DRAIN	9,838	1.86
FISHER DRAIN	15,800	2.99
45TH AVE DRAIN	5,274	1.00
GOODMAN DRAIN	18,067	3.42
HAUSER DRAIN	7,435	1.41
HODGES DRAIN	41,360	7.83
JOHN'S DRAIN (pump)	3,442	0.65
KEIM DRAIN	12,720	2.41
LOVEKIN DRAIN	27,848	5.27
LOWER BORROW PIT DRAIN	44,550	8.44
NORTHEND DRAIN	24,555	4.65
NORTON DRAIN	5,705	1.08
Old BROWN'S SLOUGH	1,840	0.35
OLIVE LAKE DRAIN	13,760	2.61
OUTFALL DRAIN	83,615	15.84
PALO VERDE DRAIN	37,936	7.18
PALO VERDE LAGOON	9,938	1.88
RANNELLS DRAIN	71,622	13.56
RICHINS DRAIN	2,810	0.53
SOUTH END DRAIN	18,406	3.49
TOWNSHIP DRAIN	14,211	2.69
TWENTIETH AVE DRAIN	8,107	1.54
UPPER BORROW PIT DRAIN	7,514	1.42
UPPER WEST SIDE DRAIN	11,980	2.27
WEST SIDE DRAIN	78,584	14.88
TOTAL DRAINS		TOTAL MILES
34		141.85
3 PUMP DRAINS		2.13
31 NON-PUMP DRAINS		139.72
Privately Maintained Drains	28,386	5.38
OLD RIVER CHANNEL South of Outfall	45,200	8.56

Table 2: Best Management Practices for PVID's Non-Point Discharges

1A] Erosion & Sediment Control:

a] Drainage channels are maintained as needed allowing natural growth in the water and on the sloped sides of the channel to minimize erosion and sedimentation. To maintain drain water flow velocities that are non erosive for the soils thru which the drains flow, the bottom of the drains are cleaned as needed so that the water surface slope is maintained between 0.0002 and 0 .0004 feet per foot (horizontal to vertical). Thus in a mile of drain, the water would naturally drop between one (at .0002) and two feet (at .0004). If erosion starts occurring, the channel is deepened until erosion activity ceases. Inside slopes of drains are allowed to grow brush and weeds. In the water, tules and reeds are allowed to grow as long as water can flow unrestrictedly down the drain channel.

b] Drain maintenance activities along the inside channel slope are performed when necessary and consists of breaking down the brush so the operator can see over it into the channel. Leaving the crushed brush on the slope helps protect the slope from erosion, rain damage and sloughing.

c] Beaver populations will be managed to prevent their construction of dams across drain channels that would cause the drain water to rise and erode or destabilize the banks.

d] If drain water levels rise due to beaver dams, plugged pipes, washouts from fields into the drains or other extra-ordinary circumstances, then channel restoration activities would consist of removing the obstruction and allowing the drain water level to drop back to normal levels over an appropriate amount of time to prevent the drain banks from destabilizing, eroding, or sloughing into the drain.

e] If more than one obstruction occurs in a stretch of drain, to prevent the ponded water levels from rising higher, saturating more of the bank, and increasing the chance of bank erosion or sloughing, only parts of the obstructions are removed. Removal starts on the most downstream obstruction and proceeds upstream to control the rate the drain water drops. This process is repeated as many times as needed over an appropriate period of time until the water levels are back to normal. Only then are the rest of the obstructions removed.

f] Restoring drain channel depth is needed when erosive velocities are generated by the flow. Long reach excavators or draglines are used to remove mud and debris from the center of the channel going downstream when possible. This allows the tule and reed growth downstream of the work area to filter and settle out any sediment stirred up by this activity.

g] Where drain water levels have risen and compromised the drain bank integrity, rock dams may be placed across the drain channel to control the rate water levels are lowered to prevent drain bank erosion or sloughing.

h] Baffles placed across the end of operational canal spillage pipes are maintained to dissipate the water's energy created by flowing water dropping into the drain. Where necessary, riprap is placed on the opposite bank at the edge of water to prevent erosion from operational spillage activities.

i] Dozer work on top of the drain bank is done in such a manner that any incidental dirt rolling into the drain is trapped by the weed growth and does not reach water.

j] Drain pipes under road crossings are usually asphaltic coated corrugated metal pipe with top of pipe submerged one foot below that site's normal water level. When a pipe starts plugging, the upstream water levels rise which saturates the drain banks and starts the process of drain bank erosion and sloughing. When someone or the person reading monthly drain gages finds a pipe that is starting to plug, it is reported to the Operations Dept. Then we promptly start the process to unplug the pipe and restore normal flows. Various levels of activity are used to unplug the pipe, from removing mud at its outlet, removing debris at inlet, or dragging a cleaning apparatus thru the pipe. When the pipe can't be unplugged, the structure is scheduled for immediate replacement. If the pipe is plugged, then pumps are used to lower the drain water levels to prevent bank sloughing while traffic detours and siphon

replacement plans are being approved.

k] Desert storm runoff water sometimes breaches the drain banks of the various drains along the toe of the mesa. Drain banks are also damaged during heavy rain downpours where low depressions occur in the banks and along county roads. Once access is possible, the breaches are promptly filled in and mud bars are removed from the channel to restore flow depth. Sediment from the runoff or breach gradually settles out in the drain as the flow slows down. During these events, any drain water sampling will be distorted due to the heavy sediment load the storm events carry into the drainage system.

l] Breaks into the drains from irrigated fields due to various reasons are promptly fixed after we receive the report. Breaks may occur because of cracks in the clay soil, gopher activity, rotted roots, or other reasons. To repair the breach, a dozer caves in the drain bank across the breach and using the dirt in the existing bank compacts the fill as best it can. If necessary, additional soil containing clay is hauled in until the bank is restored to a level about 2 feet above the field. The farmer has to fill in the hole between the bank and the field before his next irrigation. When needed, a long reach excavator is brought in to restore channel depth downstream of the breach where the sediment has settled.

m] Farmer field spills are controlled by PVID's March 1987 'Field Spill into Drain Policy'. It restricts pipe-size to 6 inch diameter pipe, limits spills for same landowner to no closer than 1 in 1320 feet, and allows about 2 ½ cfs to enter the drain from the field. To minimize sediment re-suspension, we require the pipe to extend at least 1 foot past the low edge of water mark.

1B] Facility Wastewater and Runoff from Confined Animal Facilities: Not applicable in the Palo Verde Valley drain system.

1C] Nutrient Management:

a] Nutrient applications on adjoining lands are based on recommendations derived from soil and tissue analysis to prevent excessive applications.

b] Fertilizers, both commercial and natural, and organic mulch are placed on crops and in fields based on recommendations of a professional qualified, and experienced person who takes soil and leaf samples for testing to determine a recommendation for type, quantity, and method of application to maximize crop production at minimal cost.

c] Applications of bio-solids to adjacent agricultural fields are regulated under Federal, State, and County regulations and permits and are further restricted by PVID regulations.

d] For the valley, groundwater is maintained about 10 feet below the ground surface being farmed. This 10 feet of soil acts as a buffer and allows plants to utilize nutrients for a depth that reduces the chances for nutrients to degrade the groundwater. Water surfaces in the various drains will continue to be maintained to provide this valley wide average 10 foot depth to groundwater.

e] Nutrients are applied using highly computerized applicators using GPS systems to prevent excess applications, to prevent overlapping with prior application and to prevent application to non target areas.

1D] Pesticide Management:

a] The only herbicides currently used in the drains are to eradicate the invasive weed *Salvinia molesta*. This eradication Program is under the guidance of the Giant *Salvinia* Task Force consisting of various International, Federal, State, County, and local agencies such as: International Boundary & Water Commission, United States Dept. of Agriculture, U.S. Bureau of Reclamation (USBR), U.S. Fish & Wildlife Service, California Dept. of Food & Agriculture, California Fish & Game, Arizona Game & Fish, California Regional Water Quality Control Board and PVID. Members of this Task Force are currently applying herbicides supervised by US Fish & Wildlife Service representatives in the Outfall

Drain and necessary tributary drains to control and eradicate *Salvinia molesta* under a NPDES permit issued to the USBR by the state.

b] Other herbicide applications may be made on test plots in a drain as per Label A restrictions.

c] Herbicide applicators are not allowed to clean or wash their equipment inside our drain bank maintenance area.

d] Herbicides and pesticides are applied using highly computerized applicators using GPS systems to prevent excess applications, to prevent overlapping with prior application and to prevent application to non target areas.

e] Applicator is to consider weather event forecasts for wind and rain when planning applications.

1E] Grazing Management: Domesticated animals are not allowed inside the drain maintenance area.

1F] Irrigation Water Management

a] Most of the Palo Verde Valley's farmland have fields with lineal slopes around 0.0002 feet per foot or less which reduces or eliminates the volume of tail water runoff.

b] Drain banks are designed to be at least 2 feet above the field and at least 20 feet wide. This provides a big border to prevent irrigation water from flowing over the bank to enter the drain channel.

c] If non-point source irrigation water or groundwater starts flowing into the drain at rates that compromise the integrity of the drain bank due to an irrigation activity, then PVID requires the farmer to cease that activity. This allows the drain bank to re-stabilize before the next irrigation starts.

d] Flood leaching of salts from field, rice and similar crops requiring ponded water are not allowed in PVID along drainage channels.

e] For those fields along a drainage channel that have clay layers which allow the percolating irrigation water to flow into the drain channel above the water level, PVID works with the landowner to deep rip the field away from the drain bank to interrupt those clay layers and allow the irrigation water to reach groundwater. If deep ripping does not go deep enough, then deep excavations are made along the drain channel to break up those clay layers.

1G] Education/Outreach

a] PVID personnel working around drainage channels are properly trained and monitored to perform their work in a safe, efficient manner to prevent water quality impairments from occurring.

b] When trash, debris, dead animals, etc. are found on the inside slopes of the drain, it is reported to the Sheriff's Dept., and as appropriate, removed, burned, or buried before it ends up in the water.

c] Local farmers and irrigators are provided irrigation information thru the local Cooperative Extension office.

d] PVID supplies water users with handouts, brochures, and leaflets regarding improving irrigation efficiency, new crops, new cropping methods and techniques, nutrient information when received from information sources or when requested by water users.

Table 3: Sampling Cost Estimate for PVID's Drains						8/7/2012
				Overhead		
Person samples Drain		Base rate	\$15.00	0.9535		\$29.30 = Hourly Rate
Estimate 4 hours to take 4 sample locations, 1 hour to package, 7 hours to drive to Riverside and back = 12 hours						
Item				Cost per event		Cost per Year
Labor Cost per 12 hour sampling date =			\$410.20	per day	12 days/yr	\$4,922.40
Lab Cost: 4 samples/sampling date, no insecticides=			\$660.00		8 times/yr	\$5,280.00
Lab Cost: 4 samples/sampling date for insecticides=			\$1,760.00		4 times/yr	\$7,040.00
Misc material			\$10.00		12 days/yr	\$120.00
Truck			\$4.50	per day	12 times/yr	\$54.00
Gasoline	100 miles to get sample					
	163 miles to lab					
	163 miles back					
	4 misc miles					
	total 430 miles.					
	@ 20 miles per gallon					
	21.5 gallons per trip					
	@ \$ 4.00 per gallon @ 17% overhead,		\$100.62		12 days/yr	\$1,207.44
Two meals & incidental trip expenses			\$30.00		12 days/yr	\$360.00
Cost for PVID to compare and summarize lab results and evaluate data						
			\$75.00	per event	12 days/yr	\$900.00
Cost for PVID to review 12 months data			\$400.00		1 day/yr	\$400.00
Meter drain flow at 2 sampling sites			\$900.00	for 2 sites	12 days/yr	\$10,800.00
Total for year =						\$31,083.84
Cost for Nolte to write Proposal for First year						\$11,000.00
Total for Budget, first year						\$42,083.84
Total for Budget, 2nd year plus inflation						\$34,192.00
Total for Budget, 3rd year plus inflation						\$37,611.20