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PROPOSAL FOR
INDUSTRIAL WASTE STUDY
Study Group 9, NONFERROUS METALS
(TECHNICAL PROPOSAL)

TO
FEDERAL WATER QUALITY ADMINISTRATION
ENVIRONMENTAL PROTECTION AGENCY

IN RESPONSE TO
WFP No. WA 71 - 534

SUBMITTED BY
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DECEMBER 12, 1970

STATEMENT OF THE PROBLEM

The need to establish regulatory standards and requirements for industrial wastewater effluents has been detailed in the "Introduction" and the "Statement of the Problem" sections of RFP No. MA 71 - 534; it is summarized below in order to indicate that GURHAM AND ASSOCIATES, INC. (G&A) understands the nature of the problem and the scope of the proposed study.

The approximately 300,000 water-using factories in the United States discharge each day from three to four times as much oxygen-consuming wastes as all of the severed population of the United States; furthermore, the output from this primary source of water pollution is growing at a rate several times faster than the volume of sanitary sewage. Existing State-Federal water quality standards require that all significant waste discharges receive the best practicable treatment; for industrial wastes this has been defined as "at least the equivalent of secondary treatment." However, interpretation of this requirement has been difficult because of the wide diversity of industrial wastes.

To retard the rapid deterioration of our streams and waterways, the FWQA has provided for the establishment of effluent requirements within its legislative proposals. To carry out this commitment, it is necessary that the FWQA develop guidelines for such requirements which can be passed on to and incorporated into State effluent standards.

The primary purposes of this proposed industrial waste study are:

- a) to standardize the evaluation of effluents from the subject industry; and
- b) to provide guidelines to establish effluent criteria for the industry.

In order to achieve these goals and to develop quantifiable, enforceable, and technically reasonable standards, it is necessary that the industry be classified according to its standard manufacturing processes, that the standard raw waste load be determined for each of these standard manufacturing processes, and that the

base level of treatment and the best available level of treatment be defined. In addition, it is necessary that, where current data are not sufficient, a plan for future study be developed to assure that the final effluent standards are equitable.

The FWQA has proposed that criteria on which the effluent standards are to be based shall be established by February 25, 1971. Because of this severe time restriction, the contractor will be forced to rely on available data; there can be no opportunity within this time schedule to develop new data. Therefore, the contractor must utilize his best ability to identify valid data sources and to exercise sound judgement in selecting and analyzing that data. Such judgement must be based on his own experience within the industry, and on his experience in industrial wastewater treatment.

The specific sources of information and the approaches which GMA will use in this proposed study are detailed in subsequent sections of this document. However, because time restrictions and the very nature of the study do not permit the development of unique or novel approaches, the firm's qualifications and experience, described in the pre-proposal documents submitted on December 2 and amended on December 4, 1970, must be considered as the major portion of the entire proposal.

STATEMENT OF WORK

G&A's proposed plan of operation for this study involves five major steps, as follows:

1. Definition of the industry.
2. Definition of standard manufacturing processes.
3. Determination of standard raw waste loads (SRWL).
4. Evaluation of applicable wastewater treatments and controls.
 - a Specification of base levels of treatment (BLT).
 - b Specification of best available levels of treatment (BAT).
5. Preparation of final report.

Each of these steps is described in detail below, including the sources of information, and evaluation of the validity and applicability of the data. Manpower allocations are presented in a later section.

It is planned that Steps 1 to 4, as listed above and described in the following paragraphs, will have been carried far enough for a verbal presentation by February 25, 1971.

1 Definition of the industry.

As the initial stage of this project, the industry itself must be defined to the mutual satisfaction of the FWQA team and the investigator. Related industries and certain specific segments of this industry will be excluded from the study; for example, it will not be realistic to include all minor segments. This selection must be a matter of judgement - primarily G&A's judgement, but should be agreed upon at a very early stage.

The industry itself may be divided into a number of smaller segments, each significant of itself, and each differing from the others in certain wastewater-related aspects.

TABLE IDEFINITION OF THE INDUSTRY - Study Group 9

A. By specific metal.

1. Aluminum
2. Copper
3. Zinc
4. Lead
5. Alloys: Brass

Omit: (a) because used primarily in ferroalloys: manganese, chromium, nickel, molybdenum, cobalt, vanadium.

(b) because too small a segment of the industry: sodium, tin, magnesium, uranium, antimony, titanium, tungsten, silver, cadmium, mercury, bismuth, columbium, tantalum, thorium, rare earths, and precious metals.

B. By process.

1. Primary smelting and refining.
2. Secondary smelting and refining.
3. Rolling, drawing, extruding, and other forming; and ancillary processes.
4. Foundry operations.

Omit: Mining, including leaching.

Fabrication by other than forming operations; e.g., assembling, electroplating, and coating.

A tentative but probable outline is given in Table I, on the following page.

The primary sources of information and data for definition of the industry (as well as for Steps 2, 3, and 4) will be the personal experience of GMA's principal, Dr. C. Fred Gurnham, and of the Associates. This will be supplemented by consultation with others experienced in this industry, most of whom are personally known to GMA's principal and Associates, and some of whom are specifically named in Part A of Table II, on page 6. Those marked with an asterisk (*) have agreed to work with GMA on this study; the others have not all been contacted, but are personal friends and will probably cooperate. Others may be added to the list as the study progresses.

Further information and data will be obtained from the appropriate Federal agencies (notably FWQA) and from pertinent State authorities; but it is not possible to name all of these at this time. Significant additional data will come to the project from industry or trade associations, which will play an important role in the study. The more obvious of these are named in Part B of Table II, on page 6; there may be others that can and will contribute. Contacts have been initiated with these associations - in most instances a revival of previous cooperation; but the time schedule for preparation of this proposal does not permit details.

Finally, the ultimate source of data will be the individual cooperating manufacturers. These will be selected with the advice of GMA's Associates and of Federal and State regulatory authorities. Full cooperation from the business associations is anticipated. Typical companies for this contact are listed in Part C of Table II, on page 6, but there will be several more. Those listed in Part C have had previous (or have present) contacts with GMA or its principal.

TABLE IISOURCES OF INFORMATION - Study Group 9**A Individuals who may be consulted.**

Miss, R.M.	(brass and copper)
* Duggie, F.D.	(aluminum)
* Dodge, R.F.	(brass and copper)
Hupfer, M.E.	(brass and copper)
* Parker, R.E.	(smelting)
* Tallmadge, J.A.	(brass and copper)
Walker, C.A.	(brass and copper)

B Technical associations.

Aluminum Association.

Aluminum Smelters Research Institute.

American Zinc Institute

Copper Development Association (formerly Copper and Brass Research Association).

Lead Industries Association.

United States Copper Association (formerly Copper Institute;
affiliated with American Bureau of Metal Statistics).**C Possible cooperating companies.**

Aluminum Company of America.

American Smelting and Refining Company.

Anaconda American Brass Company.

Chase Brass and Copper Company.

Eagle-Picher Industries, Inc.

Scovill Manufacturing Company.

2 Definition of standard manufacturing processes.

Standard manufacturing processes will be defined for each major segment of the industry, as noted in Step 1, above. Each manufacturing plant has its own individual system of operations and processes; it will be necessary to classify these into a small but realistic number of units that are common to most producers. Each unit may be a single manufacturing operation, or it may be a series of such operations that follow naturally in sequence. This classification must be a matter of the investigator's judgement; it will be based on the waste flows from each unit, and specifically on the raw waste loads. Included in the classification scheme will be auxiliary or supporting activities that are common to a significant portion of the industry, including but not limited to water pretreatment, power generation, and material handling and storage.

The classification will specifically include in-plant material recovery and salvage from waste streams prior to its discharge with the plant effluent, when such recovery is standard practice in the industry. In developing the standard manufacturing processes, primary consideration will be given to existing plants of modern technology. Older plants employing obsolescent processes will be noted but generally disregarded. Trends in the industry, including foreseeable new technologies, will be taken into account.

Utilizing the above classification of standard manufacturing processes for the industry as a whole, it will be possible for any individual producer to indicate which units are employed in his plant, and to quantify them in terms of some standard measure of production. Preparation of the classification plan requires detailed knowledge of the industry; this is among the capabilities of G&A's principal and Associates, and will be enhanced by the additional sources of information described earlier in Step 1 and in Table II on page 6.

3 Determination of standard raw waste loads (SRWL).

Each standard manufacturing process, defined in Step 2 above, produces a certain quantity of raw waste per unit of production or throughput and per unit of auxiliary activity. The significant parameters for the subject industry will be selected (these will include both hydraulic and quality characteristics); and the quantity of each parameter will be expressed as a numerical value - for example, in pounds of waste material per pound of production (SRWL). These values will, in fact, be ranges rather than single numbers; where averages or modified averages have significance, in the investigator's judgement, this will be reported. The range of values is itself, to some degree, a measure of the variability in process control employed in the various plants, as well as a result of differences in plant housekeeping, operating variables, size of units, and product purity requirements. This study will indicate which process controls, including material recovery and salvage, are normal to the industry or could become so with reasonable modification of the manufacturing process. The study will further report, for processes where insufficient data are available, recommended procedures for the future development of such information.

The sources of information and data for Step 3 are as noted earlier, including Table II. Some data are in the literature and in the files of the investigators; other data will be obtained from the technical associations and the individual plants studied.

4 Evaluation of applicable wastewater treatments and controls.

The wastewater treatments and controls that are available to the

industry will be evaluated from the viewpoints of applicability, effectiveness, and reliability. As a result of this evaluation, which will include the experiences of a number of manufacturing plants, O&A will be able to specify a base level of treatment (BLT) for the industry, or for each standard manufacturing process in the industry.

Extension of this evaluation by the investigators will permit specification of a best available treatment (BAT) for the industry or for each process. This extension of the study will take into account, in addition to the experiences of manufacturers with full-scale plants, the pilot plants and bench-scale studies conducted by manufacturers, equipment makers, universities, and other research organizations. Obviously, there is much responsibility on the investigator for a realistic appraisal of procedures that are still in a developmental stage.

Total impact on the environment will be considered, including the effects on atmospheric pollution and the problems of solid wastes. However, these will be matters for the investigator's judgement, and will not necessarily be quantified to the same extent as the wastewater parameters. In a similar manner, data relating the cost of treatment to the level of performance will be obtained and taken into account whenever possible; although it is not contemplated that this study will include the development of any new data.

The sources of information and data for Step 4 are as described earlier, including Table II.

5 Preparation of final report.

Using the data accumulated during the first two months of study, and covering Steps 1 to 4, a final report will be prepared. The report will include the following chapters:

- 1 Classification*
- 2 Description of standard processes, with flow diagrams
- 3 Narrative on over-all plant make-up
- 4 Available in-plant pollution controls
- 5 SRWL, with narrative
- 6 Treatment evaluation, with narrative
- 7 Effluent criteria*
- 8 Implementation guidelines
- 9 Implementation examples
- 10 Joint municipal-industrial waste treatment guidelines
- 11 Research and development needs
- 12 Bibliography (including only material used in this study).

* These sections will be supplied by FWQA, based on oral reports on Steps 1 to 4, at a meeting about February 25, 1971.

The report will include the information accumulated in Steps 1 to 4, plus a general narrative on the industry necessary for comprehensive evaluation of the industry. It will contain a complete explanation of the methods used to arrive at industry guidelines, an explanation of the guidelines, and details of the methods to be used to gather additional data where currently available data are insufficient to support the establishment of guidelines for effluent standards. It is anticipated that, if Steps 1 to 4 are completed according to schedule, the report will be submitted by May 28, 1971.

MANPOWER ALLOCATION

Based on the five basic steps outlined and described in the preceding section ("Statement of Work"), GAA anticipates the following man-day requirements to complete the project. These figures include only high-level personnel - the principal, Associates, and consultants. The division of effort among the five steps cannot be rigid at this time; in fact, most of the effort will be directed simultaneously to more than a single step. This summary is presented only as an aid for preparation and verification of the total budget. The unit used is the man-day.

<u>Step No</u>	<u>Principal Investigator</u>	<u>Associates</u>	<u>Editor- Coordinator</u>	<u>TOTAL</u>
1	1	0	0	1
2	2	6	2	10
3	3	10	5	18
4	5	20	6	31
5	10	10	20	40
	—	—	—	—
	21	46	33	100